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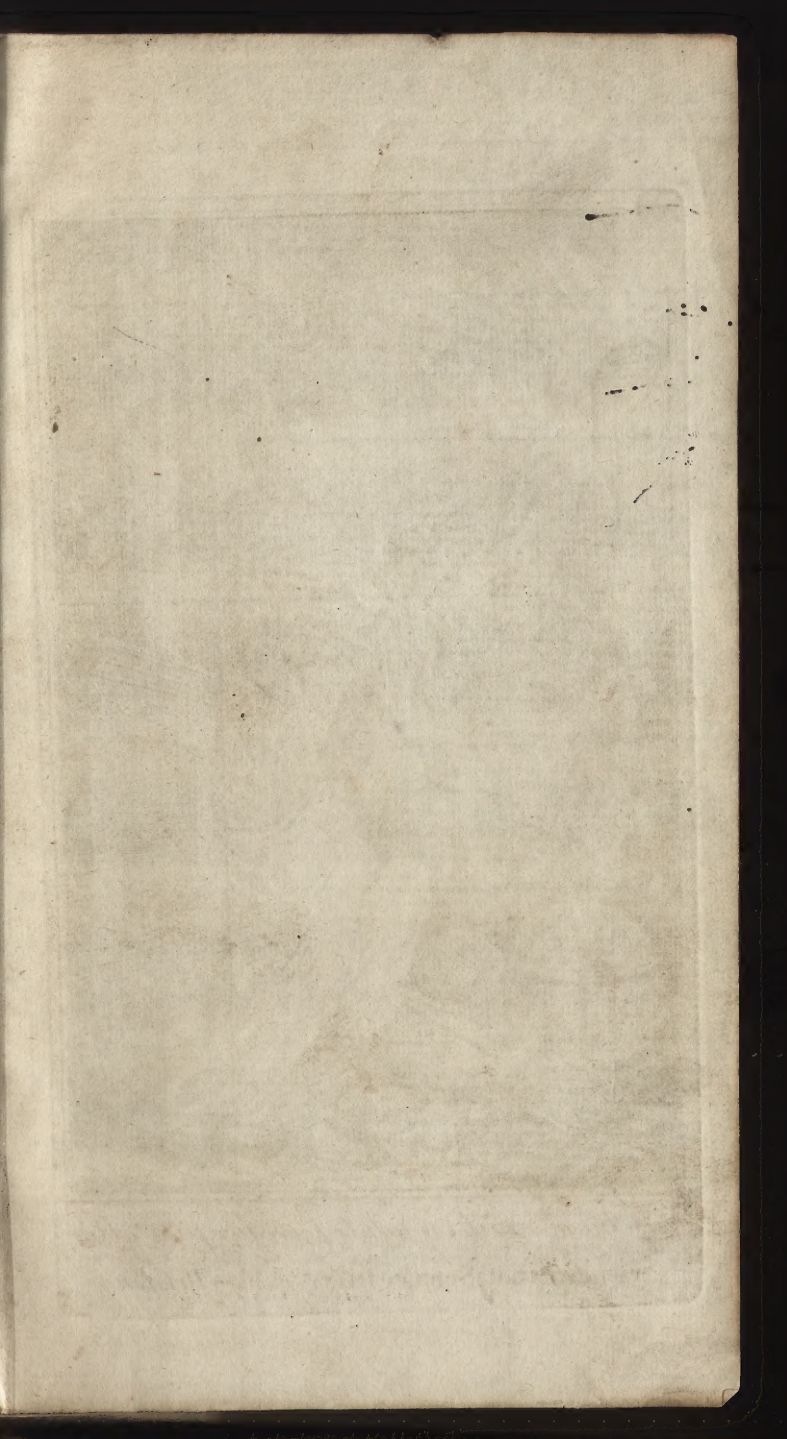
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Scire tuum nihil est nisi te Scire hoc Sciat alter
Science is not Science till reveal'd — Dryden

John Butler

T H E

ARTIST'S ASSISTANT,

In the STUDY and PRACTICE of

MECHANICAL SCIENCES.

Calculated for the Improvement of Genius.

ILLUSTRATED with COPPER-PLATES.



PRINTED FOR THE AUTHOR,
AND SOLD BY G. ROBINSON, LONDON;

AND
M. SWINNEY, BIRMINGHAM.

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MECHANICAL ENGINEERING

BY J. H. COOPER


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AND

M. SHANKS, BIRMINGHAM



P R E F A C E.

IT is needless to apologize for sending forth this production, as it is calculated to improve the rising genius, and to render the study and practice of the polite arts easy and agreeable to those who wish to tread the pleasing paths of science.

We need no greater stimulation to the study of the arts than a due contemplation of their significance to mankind, and a reflection on the estimation in which they have been held by the wisest men, and in the greatest nations upon earth. To trace their beginning among men, we should find them coeval with man himself. The remembrance of the most extraordinary events, as well as the learning of the first men, was preserved by means of the fine arts. Recalling to memory the great actions of their ancestors, they were the noblest spur to their posterity to imitate their virtues, so beneficial to society, and all great minds have ever been most sensible to impressions of this kind. It is not easy to imagine a higher merit, than that of inspiring those who were the most capable in exerting themselves in the service of human nature, with a love of glory and immortality. It is no wonder then, if the arts were held in distinguished honour by the greatest kings, and the most powerful commonwealths,

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monwealths, and that mankind considered and honoured artists as the common benefactors to human society ; and, in truth, a higher antiquity, or a more noble origin, than that of the polite arts, cannot possibly be conceived.

We shall begin with Drawing, and range the treatises on Designing, Perspective, Colours, Painting, Enamelling, Japanning, Lacquering, Staining, Engraving, Casting, Bronzing, Gilding, Silvering, &c. &c. in regular succession, under the respective heads, illustrating and explaining the most material subjects with elegant engraved designs.

Those mentioned above are the principal topics by which this work is intended to promote the improvement of the more curious kinds of manufactures: but, besides those articles, there is a number of others, of considerable moment, touched upon in this volume ; some in a more copious, and others only in a brief manner, according to the importance of the matter, or the room given for an advantageous enlargement.

The judgment or skill of the author, in the design, or execution of this performance, he candidly desires to submit to the public, and hopes that the system of instruction here laid down, will furnish such ideas, as, with the assistance of practice, will readily enable those who wish to attain a thorough knowledge of the arts, to reach the summit of their desires, which is his sole aim in publishing this compendium.



THE ARTIST'S ASSISTANT.

PRELIMINARY *to* DRAWING.

THE first and indispenfible requisite towards forming a painter is Genius, for the abfence of which divine gift no human acquirements can compenfate ; as, without that fpark of ætherial flame, ftudy would be mifapplied, and labour thrown away. Painting bears a very near refemblance to her fifter Poetry, and the Painter, like the Bard, muft be born one. A picture, as well as a poem, would afford little pleafure, though formed according to the ftrictest rules, and worked up with the moft indefatigable attention, were genius wanting to complete the design : a design, which may be faid to be like the celebrated ftatue, fashioned by Prometheus, lovely but lifelefs, unlefs genius (like the fire which he is fabled to have ftolen from Heaven) darts its invigorating ray, and gives a foul to the finifhed piece.

But, though genius is abfolutely neceffary, fince nothing can be well done without it, it will not, alone, do all things, but muft be affifted by rules, reflection, and affiduity. The memory may be, not improperly, called the repository where genius treafures up the ideas which pafs before it in continual fucceffion : from this repository the artift felechts fuch materials as the occafion demands, directed by his judgment.

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• Above all, nature is the grand object of his meditation, and ought never to be out of his sight; nature is the only source of beauty, for nothing can be pleasing that is not natural. The designer who oversteps the modesty of nature may court applause from the ignorant and vulgar, but must not expect the approbation of the discerning and polite.

Design comprehends invention and disposition; invention furnishes the subject, and disposition places that subject in the most proper situation for exhibition; nature supplies the objects; art contrasts, diversifies, and groups them. But, as every painter may not have time or opportunity to view nature in all her various lights, he will do well to contemplate the works of those great masters who knew how to make a judicious choice of subjects, and to execute them with taste and effect. On these he may rely, almost as confidently as on nature herself, and will find them of the utmost use to assist his invention. Genius need not disdain to call to its aid the productions of kindred genius; and (as a wit hath remarked) the young painter who should neglect the study of the most eminent professors of that science, on pretence of setting up for an original, would be esteemed really an original.

An author, whose title to genius is indisputable, will not write the worse for having learned his grammar, and for being acquainted with what other writers have said upon the subject which he purposes to illustrate. An intimate knowledge of the beauties of the antients will be of no small advantage; for they made nature their peculiar study, and transmitted to us examples in sculpture, which have triumphed equally over the rage of time and Barbarians; examples which have ever been considered as forming a perfect Rule of Beauty.

A close

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A close and servile imitation, however, is not what we would wish to recommend; a man may find his account in attending to the manner, and storing up the observations of a well-bred and intelligent acquaintance, without ridiculously affecting his gait, or copying his phraseology.

There are not wanting some who attribute the decline of painting to a dearth of genius, whereas it seems to spring from a very different cause; the truth is, few parents are judges of the real bent of their children's inclination, (another word for genius) and fewer still give themselves the trouble of seeking for it, considering what line of life accords most with their own wishes, or convenience. But of those few who really discover in what science nature intended their little ones to excel, how rarely do we meet with one who takes the right method to insure success, by directing their studies in the proper channel!

For though one should be apt to smile at the absurdity of those parents, or guardians, who, finding a boy possessed of a genius for painting, should, by way of initiating him in that delightful art, gravely recommend to him the study of the classics; since it seems full as reasonable to expect him to become a poet, from contemplating the works of Guido, Titian, and Raphael, as to become a painter from turning over the leaves of Homer, Horace, and Ovid. Yet can any thing be more common than to see a lad condemned to undergo a course of Latin and Greek, let the profession for which he is designed be whatever it may? But life, methinks, is too short to admit of six or seven years (and those the most important ones) being trifled away in learning what, perhaps, will prove of very little service to him in the situation which he is to be hereafter

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hereafter placed: however, if words instead of things must be the object of his study, it is, certainly, of as much importance that he should be able to clothe his thoughts in the habit of his own country as in that of any other; a living language is, at least, of as much use as a dead one; and it has been but too often remarked, that many an artist, who could express his ideas with uncommon delicacy and perspicuity on canvass, has so ill succeeded, when attempting to describe them on paper, as to incur no small share of ridicule, from the coarseness and obscurity of his diction.

The subjects first proposed to the pupil's attention will be found to influence his future practice more than may be easily imagined. First impressions sink deep and last long; and ill habits, acquired in the early part of life will sometimes adhere too closely to be entirely removed by the strongest exertions of maturer judgment; it will be, therefore, necessary to be careful that the works of none but eminent masters be put into his hands. Every figure, nay every stroke, given him as a pattern, should be masterly, that he may be familiarized to beauty, taste, and symmetry.

Experience has evinced, that more real improvement will accrue to the learner from being used to copy things in relief than from copying drawings; he will, by this method, become acquainted with the principles of light and shade, and the nature of the clear obscure; by the magic force of which, the paintings of Parrhasius were termed realities; and the fingers of Apelles' famed Alexander (in the character of Jupiter the Thunderer) seemed to shoot forward, while the lightning appeared to flash from them.

But,

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But, above all, the young student must apply his task with pleasure, as well as with perseverance; for improvement cannot reasonably be expected, if the mind (instead of being fired with emulation) gloomily contemplates the employment as a penance; nor must the patient artist be too easily satisfied with his own performance; he must review it and retouch it, again and again; he must search for its blemishes with the most rigid scrutiny, till, by repeated efforts, he brings it as near to perfection as possible. In a word, diligence, in the beginning of any study, will render the progress of it easy, and the end delightful.

Drawing has been, by some people, esteemed as an ornamental superfluity in education; but it is, in reality, a most useful accomplishment; at the same time so elegant and agreeable an amusement for leisure hours, that every neglecter of it has felt and confessed its loss. This is become so universally known, that nothing is thought more necessary to complete the education of youth than instructions for drawing, especially if their inclination or genius leads that way. For, exclusive of its great use to painters, engravers, architects, engineers, gardeners, cabinet-makers, carvers, embroiderers, statuaries, modellers, chasers, tapestry-weavers, and a number of artists and mechanics concerned in designing, how very agreeable and entertaining must it be; or what can be more useful than for any one to be able to sketch or draw a fine view from a building, or any uncommon romantic production of nature? Nothing is more properly calculated for the man of common business or the gentleman. In painting it is the sole basis on which excellence is erected; and it is, in reality, the foundation of the polite arts.

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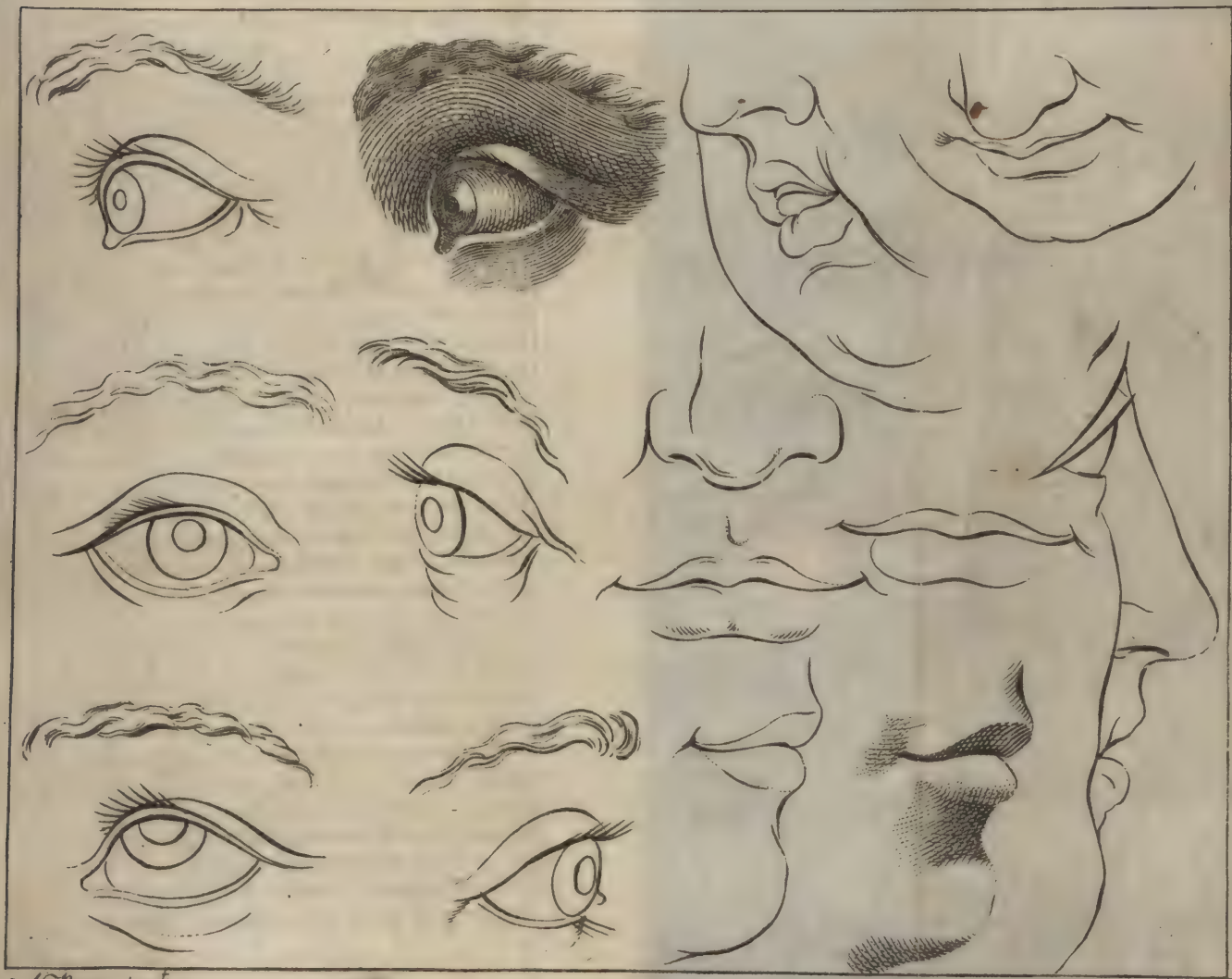
The materials necessary for drawing are, black lead pencils, camel hair pencils, a rule and compasses, crow quill pens, red, white, and black chalk, crayons and Indian ink.

The black lead pencil should not be held so near the point as a pen in writing; the use of it being for the sketch or first outline of the piece, which should be drawn with freedom, as any wrong stroke or line may with ease be erased, by rubbing the work gently with a crumb of stale bread. In order to acquire a knowledge of the face, begin with drawing the features separate, placing the copy at such a distance as the eye may measure both it and the drawing without moving the head. Sketch in the first outline very light; and in rubbing out, leave faint traces of the first sketch; by proceeding in this manner, without the assistance of rule or compasses, the outline should be brought to an approved exactness; and in placing the features, a perfect oval should be formed, through which a perpendicular line is drawn in the middle; and across the centre of this, a diameter line from one side of the oval to the other. On these all the features of the face are to be drawn, according to the following rules for drawing a head.

The perpendicular must be divided into four equal parts; one from the crown of the head to the top of the forehead; two from the top of the forehead to the eye-brows; three from the eye-brows to the bottom of the nose; four from thence to the bottom of the chin.

The diameter line divide into five parts; the breadth of the face being supposed the length of five eyes; this is to be understood in a full front face only, and these proportions are rather inconsistent in different men, as to length and shape; but

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C. le Brun inv.^t



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in a well proportioned face are nearly right, and should be strictly observed.

When the face turns to either side, then the distances are to be lessened on that side from you, more or less, in proportion to its turning. Most artists begin the drawing with the nose, that being the centre; and then proceed to the other features; observing that the top of the ear is to rise parallel to the eye-brows; the eye to be placed so as to leave exactly the length of one eye betwixt them; the nostrils should not project farther than the corner of the eye; and the middle of the mouth should be on the perpendicular line. In order to understand better the different turnings of the face, it may be very advantageous to procure a piece of wood, made in the shape and size of an egg; draw a line down the middle as before directed; divide this in two equal parts, and draw another across the centre: let the features be made as accurate as possible from the foregoing directions. By turning this oval, a great variety of faces will appear, according as it is inclined or turned; but care must be taken to observe in what manner the nose projects beyond the round of the oval. A perfect knowledge of this may enable the student to form an idea of the face better than merely copying prints or pictures without it: but after this acquisition, let the best drawings or pictures be studied that can be procured; previous to which, those passions, in manner of Le Brun, may merit imitation. The positions and actions of the hands are so various, no perfect rule or method can be given for drawing them.

Time and pains should be employed in bestowing care on those members, for it is very necessary
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not only to avoid all lameness and imperfection, but also to make them appear with life and spirit; the attainment of which must be acquired by application and practice; carefully imitating such postures, both in hands and feet, as can be procured in good prints or drawings. Lines and measures, and such mechanical rules, are not only perplexing, but rejected in the practice of the best masters. The properest method is to lightly sketch the whole shape of the hand or foot with its position or action; and examine carefully that it is correct, rubbing out and altering till it is so; when the bending of the knuckles, the veins, joints, and tendons may be drawn with much ease, after the shape and proportion is made perfect in size and attitude.

After a proper study of the legs, arms, hands, feet, &c. and the student has reason to deem himself sufficiently practised in drawing features, the human figure entire should be his next attempt; to measure which, according to a lesson from Treffnoy, "The Antients have commonly allowed eight heads, though some of them have but seven; but we ordinarily divide the figures into ten faces; that is to say, from the crown of the head to the sole of the foot, in the following manner:

"From the crown of the head to the forehead is the third part of a face.

"The face begins at the root of the lowest hairs which are upon the forehead, and ends at the bottom of the chin.

"The face is divided into three proportional parts: the first contains the forehead, the second the nose, and the third the mouth and chin.

"From

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" From the chin to the pit, betwixt the collar bones, are two lengths of a nose.

" From the pit betwixt the collar bones to the bottom of the breast, one face.

" From the bottom of the breast to the navel, one face.

" From the navel to the genitors, one face.

" From the genitors to the upper part of the knees, two faces.

" The knee contains half a face.

" From the lower part of the knee to the ancle, two faces.

" From the ancle to the sole of the foot, half a face.

" A man, when his arms are stretched out, is, from the longest finger of his right hand to the longest of his left, as broad as he is long.

" From one side of the breast to the other, two faces.

" The bone of the arm, called humerus, is the length of two faces, from the shoulder to the elbow.

" From the end of the elbow to the root of the little finger, the bone called cubitus, with part of the hand, contains two faces.

" From the box of the shoulder-blade to the pit betwixt the collar-bones, one face.

" If you would be satisfied in the measures of breadth, from the extremity of one finger to the other, so that this breadth should be equal to the length of the body, you must observe that the boxes of the elbows with the humerus, and of the humerus with the shoulder-blade, bear the proportion of half a face when the arms are stretched out.

" The

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“ The sole of the foot is the sixth part of a figure.

“ The hand is the length of the face.

“ The thumb contains a nose.

“ The inside of the arm, from the place where the muscle disappears, which makes the breast, called the pectoral muscle, to the middle of the arm, four noses.

“ From the middle of the arm to the beginning of the hand, five noses.

“ The longest toe is a nose long.

“ To the utmost parts of the teats and the pit betwixt the collar-bones of a woman are an equal lateral triangle.

“ For the breadth of the limbs no precise measure can be given; because the measures themselves are changeable, according to the quality of the persons, and according to the movement of the muscles.”

In drawing a figure there should be a slight sketch made of the whole, not beginning with the head, and finishing it, then proceeding to the other parts, a method customary to many; in consequence of which, the head is often disproportioned, or some part void of drawing. Sketch in the whole outline of the figure lightly, and measure with the eye, or draw the pencil or finger over any way to determine exactness without the rule or compasses. In beginning the sketch the head is the first object, then the shoulders in exact breadth, the trunk of the body next, observing with accuracy the breadth of the waist; next the legs, and lastly the arms and hands.

The principal difficulty is overcome when a perfect outline is procured; after which the shadows claim the attention of the student. As every appearance of bodies represented, animate or inanimate,

mate, in distance, shape, substance, and distinction, are perfected by this, let them be first made broad and massy, without attending to the many little distracted parts which fall under a second consideration. Thus far is necessary to observe in copying prints or drawings: but in drawing from a plaster figure, the eye will discover "that side lightest that the light falls upon." Most well set figures have a broad mass of light, which should be well attended to before the smaller parts are divided. The outline should be exceedingly faint in such parts as receive the light. The rising of a muscle may, by its appearance, prove deceiving, and seem darker than it really is; but by casting the eye to the other darker shadows, a true degree of its tint may be ascertained, and sometimes the light may catch on the projection of a bone near the mass of a shadow, which must be scumbled very tenderly, or it will have a harsh unpleasing effect. This may also be regulated by comparing it with the stronger lights. Observing this rule with care and exactness, is the only true means of preserving the consistency of the whole together.

There is no branch of drawing or painting requires taste in the execution more than the drapery; to manage the folds in such a manner as shall give grace and dignity to the figure; to dress it without fashion, prejudice or caprice, so as the imitation may be taken for reality, and bear the test of ages, requires the fullest exertion of true genius. Many artists first draw the naked figure and cloath it afterwards; forming the drapery to the shape and proportion of the limbs, easy and flowing, not sitting too close, but seeming to have a free motion; mak-

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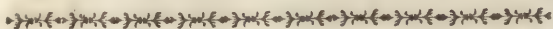
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ing first the great folds, and then properly dividing them by strokes that do not cross, nor are yet too parallel. But some useful remarks from a work lately published, include every other necessary observation concerning the human body :

“ Some artists reject the use of drawings or prints
 “ for the students imitation: it is, say they, a ser-
 “ vile method of proceeding, because it cramps the
 “ ideas; and hence genius suffers too great a con-
 “ finement. Notwithstanding this, the usual prac-
 “ tice is to copy after prints and drawings at first,
 “ and I imagine experience has determined the ad-
 “ vantages accruing from this method. To set the
 “ drawings (in particular) of the most eminent art-
 “ ists before a young beginner, at his first commence-
 “ ment, must be highly beneficial, as it most undoubt-
 “ edly will prevent rudeness and inaccuracy, against
 “ which the most exact cannot be too much guard-
 “ ed. How much more then ought the young stu-
 “ dent to observe this caution? Some geniuses re-
 “ quire restriction, and when this happens to be the
 “ case, the placing of accurate works before them
 “ must hold them in subjection, from which alone
 “ correctness is to be expected. Exact copies are
 “ absolutely to be required at first. This will im-
 “ perceptibly produce a habit of correctness, till by
 “ degrees the student will make himself master of
 “ those grand essentials to perfection, truth, bold-
 “ ness, and freedom. Truth will be acquired by
 “ this accustomed correctness, boldness and free-
 “ dom will follow after as the certain consequence,
 “ and on those the excellence of the performance
 “ must depend: copying the drawings of good
 “ masters has also another considerable advantage,
 teaching

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“teaching a good method of execution, by which
“many laborious and fruitless efforts will be pre-
“vented.”



Of DESIGNING.

DESIGN is used in painting, for the first idea of a large work, drawn roughly, and in little, with an intention to be executed and finished in large.

It is the simple contour, or out-lines of the figures intended to be represented, or the lines that terminate and circumscribe them: such design is sometimes drawn in crayons, or ink, without any shadows at all; sometimes it is hatched; that is, the shadows are expressed by sensible out-lines, usually drawn across each other with the pen, crayon, or graver. Sometimes, again, the shadows are done with the crayon rubbed so that there does not appear any lines; at other times the grains or strokes of the crayon appear, as not being rubbed; sometimes the design is washed; that is, the shadows are done with a pencil in Indian ink, or some other liquor; and sometimes the design is coloured; that is, colours are laid on much like those intended for the ground work.

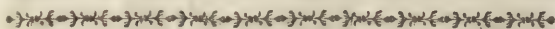
The essential requisites of a design are correctness, good taste, elegance, character, diversity, expression, and perspective. Correctness depends on the justness of the proportion, and knowledge of anatomy. Taste is a certain manner of correctness peculiar to one's self, derived either from nature, mas-

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ters, or studies, or all of them united. Elegance gives a delicacy that not only strikes persons of judgment, but communicates an agreeableness that pleases universally. The character is what is peculiar to each thing, wherein there must be diversity, inasmuch that every thing has its peculiar character to distinguish it. The expression is the representation of an object, according to the circumstances it is supposed to be in. Perspective is the representation of the parts of a painting, or a figure, according to the situation they are in with regard to the point of sight.

The design or draught, is a part of the greatest import and extent in painting. It is acquired chiefly by genius and application, rules being of less avail here than in any other branches of the art, as colouring, &c. The principal rules that regard design are, that novices accustom themselves to copy good originals at first sight; not to use squares in drawing, lest they stint and confine their judgment; to design well from life, before they practise perspective; to learn to adjust the size of their figures to the visual angle, and the distance of the eye from the model or object; to mark out all the parts of their design before they begin to shade; to make their contours in great pieces, without taking notice of the little muscles, and other breaks; to make themselves masters of the rules of perspective; to observe the perpendicular, parallel, and distance of every stroke; to compare and oppose the parts that meet and traverse the perpendicular, so as to form a kind of square in the mind, which is the great and almost the only rule of designing justly; to have a regard not only to the model, but to the parts already
ready

ready designed, there being no such thing as designing with strict justness, but by comparing and proportioning every part to the first. All the other rules relate to perspective.



Of the EXPRESSION *of the* PASSIONS.

THAT language, which, above all others, a painter should carefully endeavour to learn, and from nature herself, is the language of the passions. Without it the finest work must appear lifeless and inanimate. It is not enough for a painter to be able to delineate the most exquisite forms, give them the most graceful attitudes, and compose them well together : it is not enough to dress them out with propriety and in the most beautiful colours. It is not enough, in fine, by the powerful magic of light and shade to make the canvass vanish. No, he must likewise know how to cloath his figures with grief, with joy, with fear, with anger; he must, in some sort, write on their faces, what they think, and what they feel; he must give them life and speech. It, is indeed, in this branch that painting truly soars, and, in a manner, rises superior to herself; it is in this branch she makes the spectator apprehend much more than what she expresses.

The means, employed in her imitations by painting, are the circumspection of terms, the chiaroscuro, and colours; all which appear solely calculated to strike the visual faculty. Notwithstanding which, she contrives to represent hard and soft, rough and smooth surfaces, which are objects of touch; and this
by

by means of certain tints, and a certain chiaroscuro, which has a different look in marble, in the bark of trees, in downy and delicate substances. Nay, she contrives to express sound and motion by means of light and shade, and certain particular configurations. In some landscape's of Diderich's, we almost hear the water murmur, and see it tremble along the sides of the river, and of the boats upon it. In the battles of Burgognone we are really apt to fancy, that the trumpet sounds; and we see the horse, who has thrown his rider, scamper along the plain. But, what is still more wonderful, painting, in virtue of her various colours, and certain particular gestures, expresses even the sentiments and most hidden affections of the soul, and renders her visible, so as to make the eye not only touch and hear, but even kindle into passion and reason.

Many have written, and, amongst the rest, the famous le Brun, on the various changes, that, according to various passions, happen in the muscles of the face, which is, as it were, the dumb tongue of the soul. They observe, for example, that in fits of anger, the face reddens, the muscles of the lips puff out, the eyes sparkle; and that, on the contrary, in fits of melancholy, the eyes grow motionless and dead, the face pale, and the lips sink in. It may be of service to a painter to read these and such other remarks; but it will be of infinitely more service to study them in nature itself, from which they have been borrowed, and which exhibits them in that lively manner, which neither tongue nor pen can express.

But, if a painter is to have immediate recourse to nature in any thing, it is particularly in treating those very minute and almost imperceptible differences,

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ences, by which, however, things very different from each other are often expressed. This is particularly the case with regard to the passions of laughing and crying, as in these, however contrary, the muscles of the face operate nearly in the same manner.*

According to Lionardo de Vinci, the best masters that a painter can have recourse to in this branch, are those dumb men who have found out the method of expressing their sentiments by the motion of their hands, eyes, eye-brows, and, in short, every other part of the body. This advice, no doubt, is very good, but then such gestures must be imitated with great sobriety and moderation, least they should appear too strong and exaggerated, and the piece should shew nothing but pantomimes, when speaking figures, alone, are to be exhibited; and so become theatrical and second-hand; or, at least, look like the copy of a theatrical and second-hand nature.

* As the famous Pietro de Cortona was one day finishing the face of a crying child, in a representation of the Iron age, with which he was adorning the floor, called the Hot-bath, in the royal palace of Pitti, Ferdinand II. who happened to be looking over him for his amusement, could not forbear expressing his approbation, by crying out, Oh, how well that child cries! To whom the able artist said, Has your Majesty a mind to see how easy it is to make children laugh? Behold, I will prove it in an instant; and taking up his pencil, by giving the contour of the mouth a concave turn downwards, instead of the convex upwards, which it before had, and with little or no alteration in any other part of the face, he made the child, who, a little before, seemed ready to burst its heart with crying, appear in equal danger of bursting its sides with immoderate laughter; and then, by restoring the altered features to their former position, he soon set the child a crying again. Lectures of Philip Baldinucci, in the academy of la Crusca il Lustrato, &c.

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We are told strange things of the antient painters of Greece in regard to expression; especially of Aristides, who, in a picture of his representing a woman wounded to death at a siege, with a child crawling to her breast, makes her appear afraid, lest the child, when she was dead, should, for want of milk, suck her blood. A Medea murdering her children, by Timomachus, was likewise much cried up, as the ingenious artist contrived to express, at once, in her countenance, both the fury that hurried her on to the commission of so great a crime, and the tenderness of a mother that seemed to withhold her from it. Rubens attempted to express such a double effect in the face of Mary of Medicis, still in pain from her past labour, and, at the same time, full of joy at the birth of a Dauphin. And in the countenance of Sancta Polonia, painted by Tiepolo, for St. Anthony's church at Padua, one may, I think, clearly read a mixture of pain from the wound given her by the executioner, and of pleasure from the prospect of paradise opened to her by it.

Few, to say the truth, are the examples of strong expression afforded by the Venetian, Flemish, or Lombard schools. Deprived of that great happiness, the happiness of being able to contemplate at leisure, the works of the antients, the purest sources of perfection in point of design, expression and character; and having nothing but nature constantly before their eyes, they made strength of colouring, blooming complexions, and the grand effects of the chiaroscuro their principal study; they aimed more at charming the senses than at captivating the understanding.

The Venetians, in particular, seem to have placed their whole glory in setting off their pieces with all
that

that rich variety of personages and dress, which their capital is continually receiving by means of its extensive commerce, and which attracts so much the eyes of all those who visit it. I doubt much, if, in all the pictures of Paolo Veronese, there is to be found a bold and judicious expression, or one of those attitudes, which, as Petrarch expresses it, speak without words; unless, perhaps, it be that remarkable one in his Marriage-feast-at-Cana-of-Galilee, and which I do not remember to have seen taken notice of before. At one end of the table, and directly opposite to the bridegroom, whose eyes are fixed upon her, there appears a woman in red, holding up to him the skirt of her garment, as much as to say, I suppose, that the wine miraculously produced was exactly of the colour with the stuff on her back. And, in fact, it is red wine we see in the cup and pitchers. But all this while the faces and attitudes of most of the company betray not the least sign of wonder at so extraordinary a miracle. They all, in a manner, appear intent upon nothing but eating, drinking, and making merry. Such, in general is the stile of the Venetian school. The Florentine, over which Michael Angelo presided, above all things curious of design, was most minutely and scrupulously exact in point of anatomy. On this she set her heart, and took singular pleasure in displaying it. Not only elegance of form, and nobleness of invention, but likewise strength of expression, triumph in the Roman school, nursed, as it were, amongst the works of the Greeks, and in the bosom of a city, which had once been the seminary of learning and politeness. Here it was, that Domenichino and Poussin, both great masters of ex-

D pression,

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pression, refined themselves, as appears more particularly by the St. Jerome of the one, and the death of Germanicus, or the slaughter of the Innocents, by the other. Here it was that arose Raphael, the sovereign master of them all. One would imagine, that, pictures which are generally considered as the books of the ignorant, and of the ignorant only, he had undertaken to make the instructors even of the learned. One would imagine, that he intended, in some measure, to justify Quintilian, who affirms, that painting has more power over us than all the arts of rhetorick. There is not, indeed, a single picture of Raphael's, from the study of which, those who are curious in point of expression, may not reap great benefit; particularly his martyrdom of Saint Felicitas; his Magdalen in the house of the Pharisee; his Transfiguration; his Joseph explaining to Pharaoh his dream, a piece so highly rated by Poussin. His school of Athens, in Vatican, is, to all intents and purposes, a school of expression. Among the many miracles of art, with which this piece abounds, I shall single out that of the four boys attending on a Mathematician, who stooping to the ground, his compasses in his hand, is giving them the demonstration of a theorem. One of the boys, recollected within himself, keeps back, with all the appearance of profound attention to the reasoning of the master; another by the briskness of his attitude discovers a greater quickness of apprehension; while the third, who has already seized the conclusion, is endeavouring to beat it into the fourth, who, standing motionless, with open arms, a staring countenance, and an unspeakable air of stupidity in his looks, will never, perhaps, be able to
make

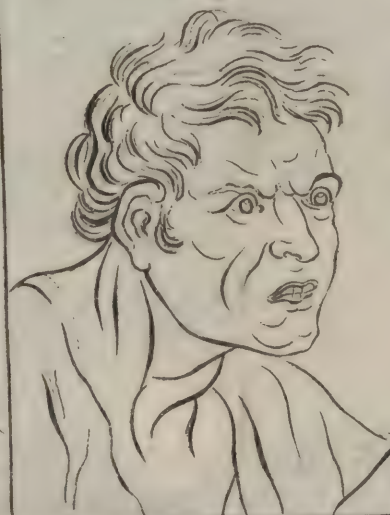
Admiration



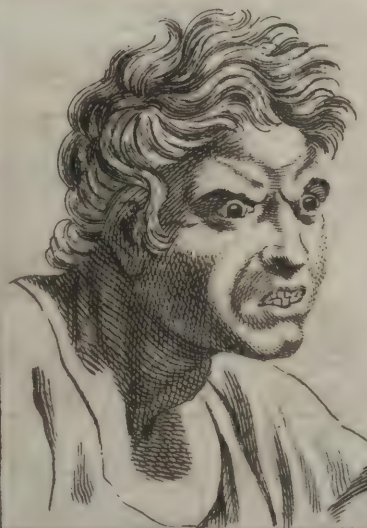
Contempt



Rage



Calmness





make any thing of the matter. And it is probably, from this very groupe, that Albani, who studied Raphael so closely, drew the following precept of his; "That it behoves a painter to express more circumstances than one by every attitude; and so to employ his figures, that, by barely seeing what they are actually about, one may be able to guess, both what they have been already doing, and are next going to do." This I know to be a difficult precept; but I know too, that it is only by a due observance of it, the eye and the mind can be made to hang in suspense on a painted piece of canvas. It is expression, that a painter, ambitious to soar in his profession, must, above all things, labour to perfect himself in. It is the last goal of his art, as Socrates proves to Parrhasius. It is in expression that dumb poetry consists, and what the prince of our poets calls a visible language.



P E R S P E C T I V E.

PERSPECTIVE is the art of delineating visible objects on a plain surface, such as they appear at a given distance or height, upon a transparent plane, placed perpendicular to the horizon, between the eye and the object.

There are three sorts of perspective, viz. linear, ærial, and specular perspective.

Linear perspective (to which most properly belongs our definition, and which is a branch of the mathematics) regards the position, magnitude, form, &c. of the

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the several lines or contours of objects, and express their diminution.

Aerial perspective (which makes part of the art of painting) regards the colour, lustre, strength, boldness, &c. of distant objects, considered as seen through a column of air, and expresses the diminutions thereof.

Specular perspective represents the objects in conical, spherical, or other mirrors, erect and clear; whereas on lawn, and other planes, they appear confused and irregular.

These three sorts of perspective have each its particular doctrine; but before we proceed on the explanation of the doctrine, we must teach our pupils what are planes in perspective; of which there are five sorts, viz. perspective, geometrical, horizontal, vertical, and objective plane.

Perspective plane is a plain pellucid surface, ordinarily perpendicular to the horizon, and placed between the spectator's eye and the object he views; through which the optick rays, emitted from the several points of the objects, are supposed to pass to the eye, and in their passage to leave marks that represent them on the said plane.

A geometrical plane, is a plane parallel to the horizon, whereon the object to be delineated is supposed to be placed: This plane is usually at right angles with the perspective plane.—A horizontal plane is a plane passing through the spectator's eye, parallel to the horizon, cutting the perspective plane, when that is perpendicular to the geometrical one, at right angles.—A vertical plane, is a plane passing through the spectator's eye, perpendicular to the geometrical one; and usually parallel to the perspective plane. An objective plane, is any plane situate in the horizontal

zontal plane, whose representation is required in perspective.

There are likewise several different lines in perspective, viz. terrestrial line, geometrical line, line of the front, vertical line, visual line, line of station, objective line, and line of distance.—Geometrical line, in perspective, is a right line drawn in any manner on the geometrical plane.—A terrestrial line, or fundamental line, is a right line, wherein the geometrical plane, and that of the picture, or draught intersect one another. Such is the line formed by the intersection of the geometrical plane, and the perspective plane.—A line of the front, is any right line, parallel to the terrestrial line.—A vertical line, is the common section of the vertical, and of the draught. A visual line, is the line, or ray, imagined to pass from the object to the eye.—An objective line, is any line drawn on the geometrical plane, whose representation is sought for in draughts or pictures.—A line of station, according to some writers, is the common section of the geometrical and vertical planes. Others mean by it the perpendicular height of the eye above the geometrical plane, whose representation is sought for in draughts or pictures.—A line of distance, is a right line drawn from the eye to the principal point: this, as it is perpendicular to the perpendiculars of the plane, or table, can only be the distance of the eye from the table.—The point of the distance, in perspective, is a point in the horizontal line, at such distance from the principal point, as is that of the eye from the same.

There are other points besides this point of distance in perspective, viz. the point of sight, the third point, the objective point, the accidental point, and
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the visual point; which term point, is used for various parts, or places, with regard to the perspective plane.—The point of sight, or of the eye, is a point on the plane, marked out by a right line drawn from the eye, perpendicular to the plane: This is also called the principal point. This point is in the intersection of the horizontal and vertical planes. Some authors call it the principal point; and give the name point of sight, or vision, to the point wherein the eye is actually placed, and where all the rays terminate.—The third point, is a point taken at discretion in the line of distance, wherein all the diagonals drawn from the divisions of the geometrical plane, whose representation is required on the perspective plane.—An accidental point, is a point in the horizontal lines, where lines parallel to one another, though not perpendicular to the picture, or representation meet.—A visual point, is a point in the horizontal line, wherein all the ocular rays unite. Thus a person standing in a strait long gallery, and looking forwards, the side, the floor, and ceiling seem to meet, and touch one another in a point, or common centre.

These things previously considered, I'll pass to the Explanation of the different sorts of perspective.

1. *From a point in a given line AB, to raise a perpendicular.*
See fig. II.

Draw with the ruler the given line AB; then set one foot of your compasses in B, and extending them to rather more than half the length of the line AB, sweep the arch cd; and with the same extent of compasses set one point in c, and sweep the arch cf; then, without altering the compasses,

set

set one foot in g, and describe the arch h i; next rule through the points c g, to intersect the arch h i in k, and draw the line from k to B, which is the perpendicular required.

2. *Another way. See fig. III.*

From the point A take the equal distances A B and A C on each side of it, then stretch the compasses to any distance greater than A B or A C, and with one foot of them in B sweep the arch d e; then, with the same extent of compasses, set one point in C, sweep the arch f g; and these two arches will intersect each other in the point h, from which a line drawn to the point A is the perpendicular required.

3. *To draw one line parallel (or equi-distant) to another given line A B. See fig. IV.*

Extend your compasses to the distance of the parallel you require; then with one foot in any point of the given line, as in c, describe the arch d e. Again, without altering the compasses, fix one foot in any other point, as in f, and sweep the arch g h; then rule the line I K, touching the outward parts of the two arches, and that will be the parallel to the given line.

4. *To bisect or divide a given line A B, into two equal parts. See fig. V.*

Take with your compasses any distance greater than half the given line; then with one foot of them in B, sweep

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B, sweep the arch $c c$; and with the same distance, setting one foot in A, sweep the arch $d d$; and these arches will intersect each other in the points $g h$; which joined by a perpendicular, will intersect $A B$ in the middle point i .

5. *Upon the end A of a given line, A B, to raise a perpendicular. See fig. VI.*

Place one foot of the compasses in A, and extend them to any point c without the given line; then set one foot of them in c and turn the circle $d e$ and A, and through $d c$ draw the diameter $d c e$, meeting the circle in e ; join $A e$, and that right line is the perpendicular required.

6. *To turn the circle through any three given points not in a right line. See fig. VII.*

Fix three points at any distance you think proper, as at $A B$ and C , and join them by the right lines $A B$ and $B C$; then by fig. V. bisect the line $A B$ with the line $d e$; which done bisect the line $B C$ with the line $f e$; and from the center e , where these lines meet, extend your compasses to A, and describe the circle $A B C G$.

7. *To draw an oval. See fig. VIII.*

Draw a given line $A B$, which divide into four equal parts; set one foot of the compasses at C , and from that center describe a circle $e e$; with the same extent of compasses place one foot in the center D , and turn the circle $f f$; then with one foot still in D , extend

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D, extend your compasses, and turn the arch g g; and with the same extent, placing one foot in C, describe the arch h h; join the intersections with a perpendicular from i to k; next, place one foot of the compasses in i, sweep the arch L L, and without altering them, set one foot in k, and describe the arch M M.

8. *Another method for an oval. See fig. IX.*

Draw a given line A D, and with the compasses extended, placing one foot in B, with the other turn the circle e e; then, without altering your compasses, on the line A D in the supposed point C sweep the circle f f, and through the points g g, where the two circles intersect, draw the perpendicular h i; then fix your compasses with one foot in h, and extend them so as to describe the arch k k to the lower extremities of the circles; then, with the same extent, with one foot in i, sweep the arch l l, to join the upper extremities.

By these examples it will appear, that an oval of any form or size may be constructed at pleasure, only taking care always to fix the compasses equidistant from the given line A D in the perpendicular h i.

PRACTICAL EXAMPLES in PERSPECTIVE.

1. *To draw a square pavement in perspective. See fig. X. and XI.*

Suppose your piece of pavement to consist of sixty-four pieces of marble, each a foot square. Your
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first

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first business is, to draw an ichnographical plan or ground plot of it, which is thus performed. Having made an exact square of the size you intend your plan, divide the base and horizon into eight equal parts, and from every division in the base to its opposite point in the horizon, rule perpendicular lines; then divide the sides into the same number, ruling parallel lines across from point to point; so will your pavement be divided into sixty-four square feet; because the eight feet in length, multiplied by the same in breadth give the number of square feet or pieces of marble contained in the whole: then rule diagonals from corner to corner; and thus will your ground plot appear as in fig. X.

Now, to lay this in perspective, draw another square to your intended size, and divide the base line A B into eight equal parts, as before; then fix your point of sight C in the middle of the horizon D E, and from the same point rule lines to every division in the base A B; after which, rule diagonal lines from D to B, and from E to A, answerable to those in the ground plot, and your square will be reduced to the triangle A B C; then from the point F, where the diagonal D B intersects the line A C, to the opposite intersection G, where the diagonal E A crosses the line C B, rule a parallel line, which is the abridgment of the square.

Then through the points where the diagonals cross the rest of the lines which go from the base to the point of sight, rule parallel lines, and your square pavement will be laid in perspective, as in fig. XI.

2. *To find the height and proportion of any objects, as they appear above the horizon, on a supposed plane. See fig. XII.*

First, rule your horizontal line N O, and fix your point of sight, as at M; then mark the place of your nearest pillar, by making a dot for the base or bottom, as at A; and another for the summit or top, as at B: rule a line from A to the point of sight M, and another from B to M, and these two lines will give the height of any number of pillars. As for example; suppose you would have a pillar at C, fix your dot for the base, and rule from thence a parallel line to meet the diagonal A M at D; then rule the perpendicular D E to the diagonal B M; which perpendicular is the height of your figure required at C. Or, if you would place pillars at F and I, observe the same method, ruling the parallels F G and I K, and the perpendiculars G H and K L will give their heights at the distances required.

To find the diameter or thickness of pillars at any particular distances, you are also to be guided by that nearest the base. For instance; suppose your nearest pillar A B to be ten feet high and one foot in diameter: divide it from top to bottom into ten equal parts, and set off one of them upon the base of the pillar; then rule a line from the point of sight M to the diameter P, and you will have the thickness of all your pillars on their respective parallels or bases.

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3. *The same rule exemplified in objects below the horizon.* See fig. XIII.

If you would know the heights of a number of figures below the horizon, rule your horizontal line QR , and fix your point of sight, as at P ; then place your nearest figure, or mark the dots for the head and feet, by the points A and B , which answers the same purpose; and rule from these dots to the point of sight the lines AP and BP ; and if you would find the height of a figure to be drawn at c , rule from thence the parallel cd to the diagonal BP , and the perpendicular de will give the height required. The same directions will shew the height of a figure at any other distance you have a mind to place it, as at f , i , and m , by ruling the parallels fg , ik , and mn ; and from each of these their respective perpendiculars gh , kl , and no ; which perpendiculars will shew the heights of the figures at f , i , and m .

4. *To draw a direct view.* See fig. XIV.

To illustrate this example, suppose you were to draw the inside of a church, as represented in this figure: first take your station at the point A , in the center of the base line BC , from which you have a front view of the whole body of the church, with all the pillars, &c. on each side; then fix your horizon at any height you think proper as at DE ; bisect it by the perpendicular EA ; and where these two lines intersect, is the point of sight F . (This perpendicular will pass through the center of all the
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the arches in the dome or cupola: which centers may be found by any three given points, as in fig. VII.) Next divide your base line into any given number of feet; and the visual lines ruled from these divisions to the point of sight, will reduce all your objects to their just proportion, by setting off their height upon a perpendicular raised at their respective distances. The base, in the example here given, is divided into twelve equal parts of five feet each; from which (supposing your front column to be thirty-five feet high) take seven divisions from the base line of your drawing, and set them off upon the perpendicular G H; then (supposing this column to be five feet thick at the base) set off one of those divisions upon the parallel I K, which is the breadth required. So that, by proportioning this scale to any distance by the foregoing directions, you may not only find the dimensions of all your columns, but also of every distinct part of them, as well as of all the doors, windows, and other objects that occur. For instance; having found the height and breadth of your nearest column G, draw from the top and bottom of the said column to the point of sight the lines H F and K F; after which, rule the line I F from the base of the column to the point of sight, and you have the height and breadth of all the rest of the columns, as has been already shewn in fig. XII.

By ruling lines from the points a, b, c, d, &c. to the point of sight, you will see that all the summits and bases of your columns, doors, windows, &c. must tend immediately to that point; and by lines drawn from the points 1, 2, 3, 4, &c. on each side, to the correspondent points on the opposite side, may
be

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be seen all the parts of your building lying upon the same parallel.

5. *To draw an oblique view. See fig. XV.*

First, draw your horizontal line A B; then, if your favourite object be on the right hand, as at C, place yourself on the left hand upon the base line, as at D; then from that station erect a perpendicular D E, which will pass through the horizon at the point of sight F; to which rule the diagonals G F and H F, which will shew the roof and base of your principal building C, and will also, as before directed, serve as a standard for all the rest.

Observe also, either in direct or oblique views, whether the prospect before you makes a curve; for if it does, you must be careful to make the same curve in your drawing.

6. *To draw a perspective view, wherein are accidental points. See fig. XVI.*

Rule your horizontal line a h, and on one part of it fix your point of sight, as at c; from which rule the diagonals c d and c e on the one side, and c f and c g on the other; which will shew the roofs and bases of all the houses in the street directly facing you (supposing yourself placed at A in the center of the base line). Then fix your accidental points g and h upon the horizontal line, and rule from them to the angles i k and l m (where the streets on each side take a different direction, towards the accidental points g and h) and the lines g i and g k give the roofs and bases of all the buildings on one side, as l h and m h do on the other.

Accidental

Accidental points seldom intervene where the distance is small, as in noblemen's seats, groves, canals, &c. which may be drawn by the strict rules of perspective; but where the prospect is extensive and varied, including mountains, bridges, castles, rivers, precipices, woods, cities, &c. it will require such an infinite number of accidental points, that it will be better to do them as nature shall dictate, and your ripened judgment approve.

7. *To find the center for the roof of a house, in an oblique view. See plate IV.*

Suppose from the point of sight A, the visual lines B A and A C be drawn, B C being one perpendicular given, and D E the other, rule the diagonals from D to C, and from E to B, and the perpendicular F G, raised through the point of their intersection, will shew the true center of the roof, as will appear by ruling the lines G E and G C.

For want of being acquainted with this necessary rule, many, who have been well versed in other parts of perspective, have spoiled the look of their picture, by drawing the roofs of their houses out of their true perpendicular.

Perspective is either employed in representing the ichnographies, and ground-plots of objects as projective planes; or in scenographies, and representations of the bodies themselves.

Ichnography, in perspective, is the view of any thing cut off by a plain parallel to the horizon, just at the base or bottom of it; so that ichnography is the same with what is otherwise called the plan, geometrical plan, or ground-plot of any thing.

Scenography,

Scenography, in perspective, is a representation of a body on a perspective plane; or a description thereof in all its dimensions, such as it appears to the eye. The ichnography of a building, &c. represents the plan, or ground-work of the building. The orthography the front, or one of the sides; and the scenography the whole building, front, sides, height and all, raised on the geometrical plan.

Projection, in perspective, denotes the appearance or representation of an object on the perspective plane. The projection, e, g r, of a point, is a point through which the optick ray passes from the objective point through the plane to the eye; or it is the point wherein the plane cuts the optick ray. And hence is easily conceived what is meant by the projection of a line, a plane, or a solid.

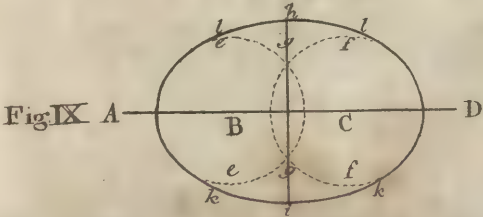
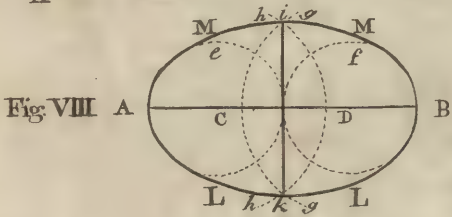
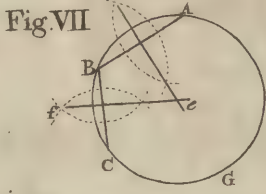
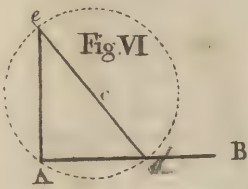
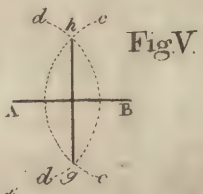
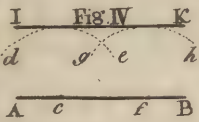
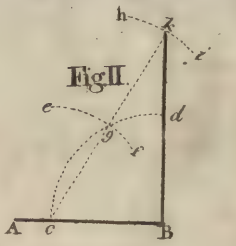
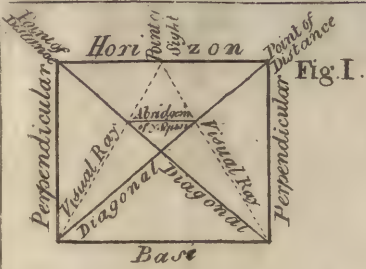
The projection of the sphere in plane, is a representation of several points or places of the surface of the sphere, and of the circles described thereon, or of any assigned parts thereof, such as they appear to the eye situate at any given distance, upon a transparent plane placed between the eye and the sphere. The principal use of the projection of the sphere is in the construction of planispheres, and particularly maps and charts, which are said to be of this or that projection, according to the several situations of the eye, and the perspective plane with regard to the meridians, parallels, and other points and places to be represented. The projection of the sphere is usually divided into orthographic and stereographic.

Orthographic projection, is that wherein the superficies of the sphere is drawn on a plane, cutting it in the middle; the eye being placed at an infinite distance vertically to one of the hemispheres. The laws

laws of this sort of projection are these: 1. The rays by which the eye at an infinite distance perceives any object, are parallel. 2. A right line perpendicular to the plane of the projection, is projected into a point, where that right line cuts the plane of the projection. 3. A right line not perpendicular, but either parallel or oblique to the plane of the projection, is projected into a right line, and is always comprehended between the extreme perpendiculars. 4. The projection of the right line is the greatest, when that line is parallel to the plane of the projection. 5. Hence it is evident, that a line parallel to the plane of the projection, is projected into a right line equal to itself; but if it be oblique to the plane of the projection, it is projected into one which is less. 6. A plane surface, at right angles to the plane of the projection, is projected into that right line, in which it cuts the plane of the projection. Hence it is evident, that a circle standing at right angles to the plane of the projection which passes through its center, is projected into that diameter, in which it cuts the plane of the projection. 7. A circle parallel to the plane of the projection, is projected into a circle equal to itself; and a circle oblique to the plane of the projection, is projected into an ellipsis.

Stereographic projection, is that wherein the surface and circles of the sphere are drawn upon the plane of a great circle, the eye being in the pole of that circle. As to the properties of this sort of projection: 1. In this projection a right circle is projected into a line of half tangents. 2. The representation of a right circle perpendicularly opposed to the eye, will be a circle in the plane of the pro-

jection. 3. The representation of a circle placed obliquely to the eye, will be a circle in the plane of projection. 4. If a great circle is to be projected on the plane of another great circle, its center will lie in the line of measures, distant from the center of the primitive by the tangent of its elevation above the plane of the primitive. 5. If a lesser circle, whose poles lie in the plane of the projection, were to be projected, the center of its representation would lie in the line of measures, distant from the center of the primitive, by the secant of the lesser circles distance from its pole, and its semi-diameter or radius be equal to the tangent of that distance. 6. If a lesser circle were to be projected, whose poles lie not in the plane of the projection, its diameter in the projection, if it falls on each side of the pole of the primitive, will be equal to the sum of the half tangents of its greatest and nearest distance from the pole of the primitive, set each way from the center of the primitive in the line of measures. 7. If the lesser circle to be projected, falls entirely on one side of the pole of projection, and does not encompass it, then will all its diameter be equal to the difference of the half tangents of its greatest and nearest distance from the pole of the primitive, set off from the center of the primitive one, and the same way in the line of measures. 8. In the stereographic projection, the angles made by the circles of the surface of the sphere, are equal to the angles made by their representation in the plane of their projection.





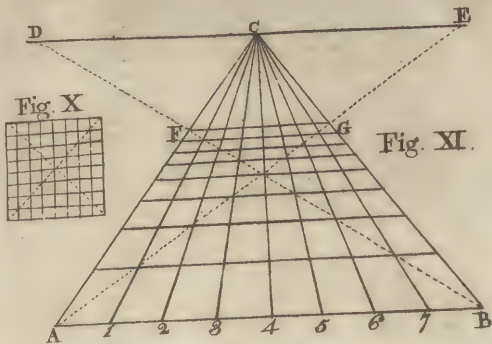


Fig. XII

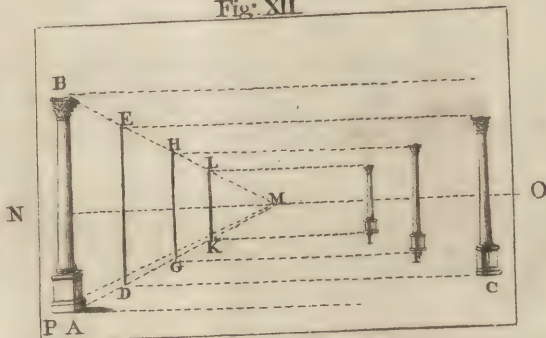


Fig. XIII

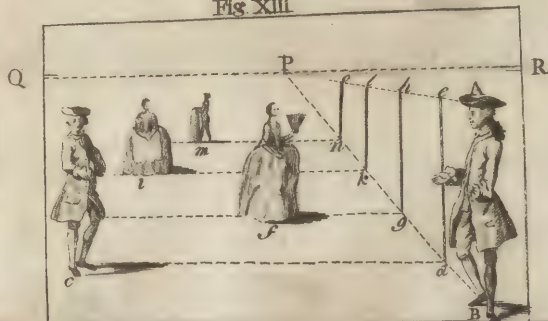


Fig XIV.

Perspective plate VII

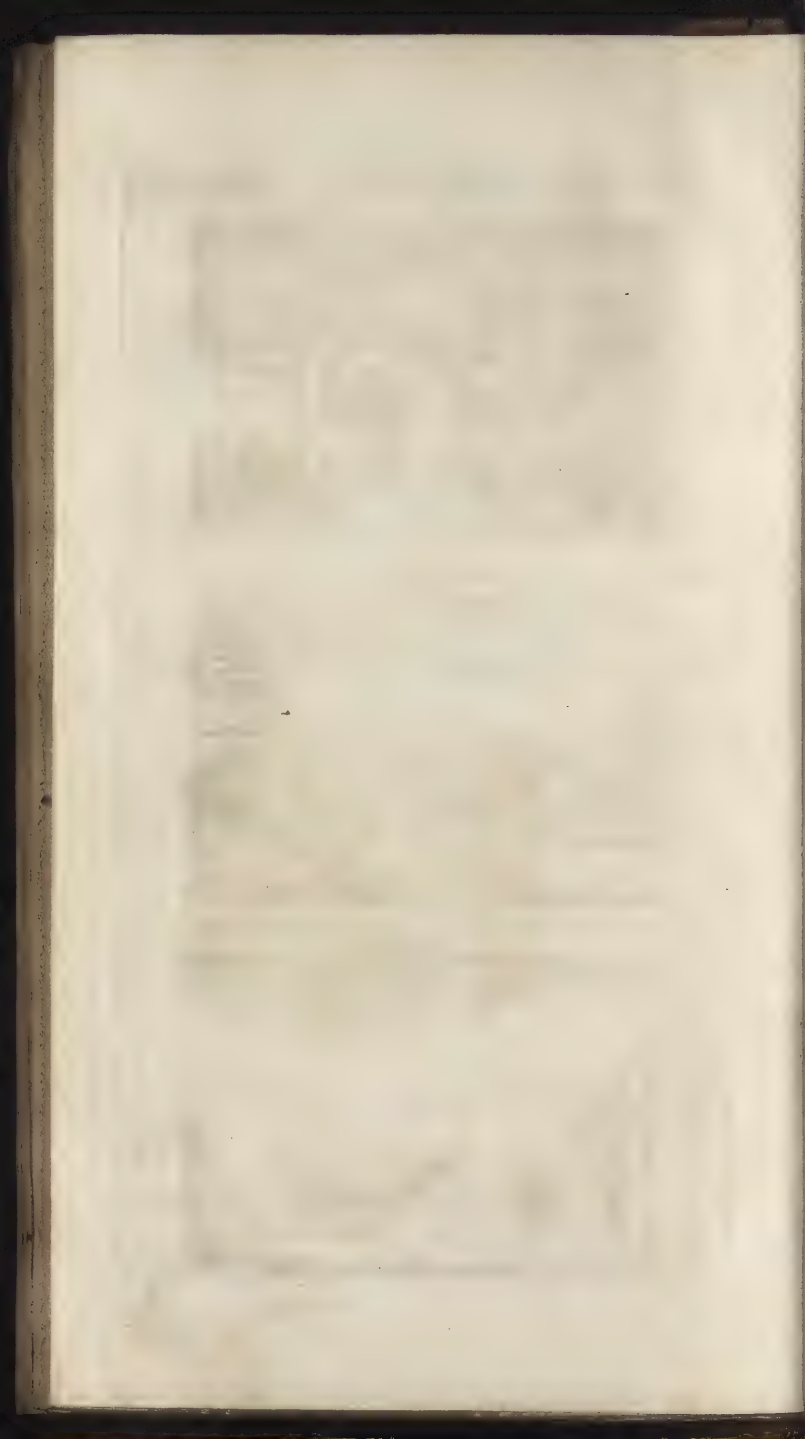


Fig XV

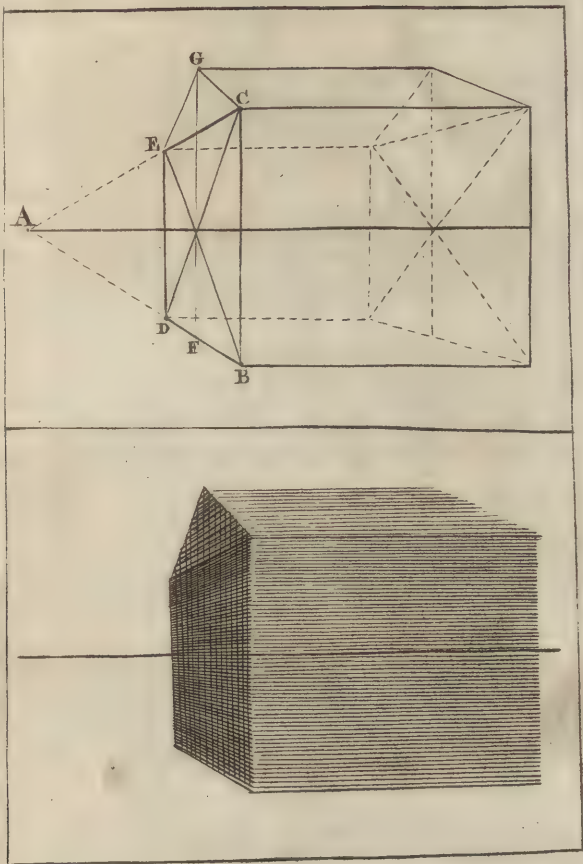


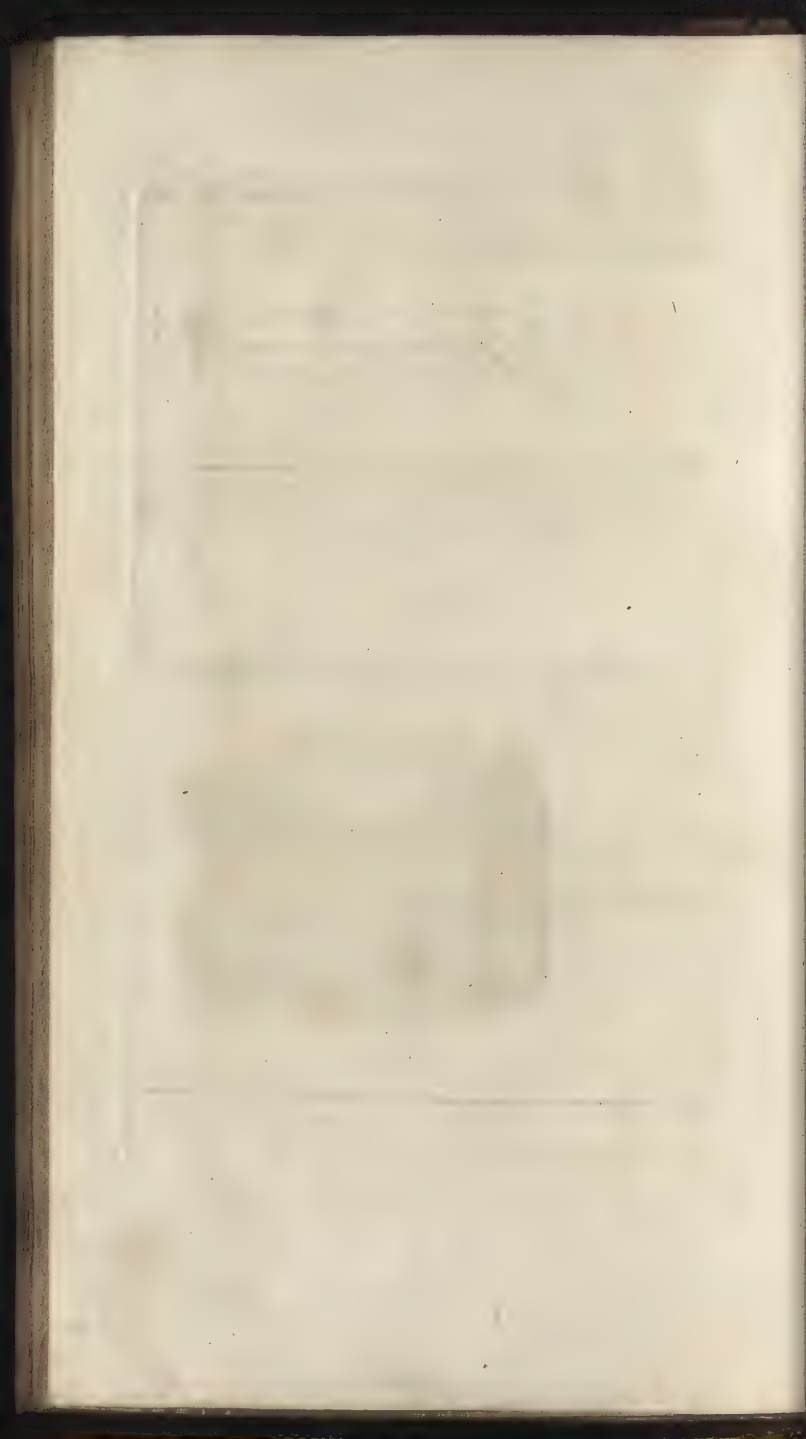
Fig XVI.





Perspective Plate III.





Of COLOURS.

The method of preparing the various kinds used in painting.

IT will now be proper to explain in an easy manner, the method of preparing the various bodies employed by painters, for producing the difference of light and shade; which may be termed either pigments or fluids, as they are solid or aqueous; and are distinguished in their several kinds according to the manner of working them; as oil-colours, water-colours, enamel-colours, &c. but their variety are too numerous to be in general use: most painters therefore select a set out of them, and become very unjustly prejudiced against those they reject. It is no little impediment to their improvement in the profession, that they are not more extensively acquainted with all the ingredients fit for their purposes.

Those colours which become transparent in oil, such as lake, Prussian blue, and brown pink, are frequently used without the admixture of white, or any other opaque pigment; by which means the tint of the ground on which they are laid retains, in some degree, its force; and the real colour, produced in painting, is the combined effect of both. This is called glazing; and the pigments endued with the property of becoming transparent in oil, are called glazing colours.

As colours are obtained from various substances, the means of preparing them are consequently vari-

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ous; some being of a simple nature, and requiring only to be purified and reduced to a proper consistence or texture; and others being compounds of different bodies, to be formed only by complex processes. It is therefore very difficult to give such general directions, for the making every sort of colour as may be intelligible to all; the utensils to be employed, as well as the methods to be pursued, being such as belong to different arts and trades.

Where, nevertheless, simple means, and the use of such utensils as are generally known, may be sufficient to perform what is wanting, it is best to avoid all technical terms, and more complex methods of operation, adopting such a mode of instruction as may be universally intelligible:—We now proceed to the nature and preparation of the different colours, as they follow in their classes.

CLASS I. * Of RED COLOURS.

VERMILLION, is one of the most useful colours in every kind of painting; except enamel or on glass; as it is of a moderate price, spends to great advantage in any kind of work, and stands or holds its colour

* CLASS I. RED.

<i>Scarlet, or tending to the orange.</i>	<i>Crimson, or tending to the purple.</i>
Vermillion.	Carmine.
Native cinnabar.	Lake.
Red lead.	Rose pink.
Scarlet oker.	Red oker.
Common Indian red.	Venetian red.
Spanish brown.	
<i>Terra di sienna burnt,</i>	

colour extremely well. It may be prepared in great perfection by the following process.

“ Take of quicksilver eighteen pounds, of flowers
 “ of sulphur six pounds: melt the sulphur in an
 “ earthen pot; and pour in the quicksilver gradual-
 “ ly, being also gently warmed; and stir them well
 “ together, with the small end of a tobacco-pipe.
 “ But, if from the effervescence, on adding the latter
 “ quantities of the quicksilver, they take fire, extin-
 “ guish it by throwing a wet cloth (which should be
 “ had ready) over the vessel. When the mass is cold,
 “ powder it, so that the several parts may be well
 “ mixed together. But it is not necessary to reduce
 “ it, by nicer levigation, to an impalpable state.
 “ Having then prepared an oblong glass body, or
 “ sublimer, by coating it well with fire-lute over
 “ the whole surface of the glass, and working
 “ a proper rim of the same round it, by which it
 “ may be hung in the furnace in such a manner that
 “ one half of it may be exposed to the fire, fix it in
 “ a proper furnace, and let the powdered mass be
 “ put into it, so as to nearly fill the part that is
 “ within the furnace; a piece of broken tile being
 “ laid over the mouth of the glass. Sublime then
 “ the contents, with as strong a heat as may be used
 “ without blowing the fumes of the vermilion out
 “ of the mouth of the sublimer. When the sublima-
 “ tion is over, which may be perceived by the
 “ abatement of the heat towards the top of the body,
 “ discontinue the fire; and, after the body is cold,
 “ take it out of the furnace, and break it: collect
 “ then together all the parts of the sublimed cake,
 “ separating carefully from them any dross that may
 “ have been left at the bottom of the body, as also
 any

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“any lighter substance that may have formed in the neck, and appears to be dissimilar to the rest. Levigate the more perfect part; and, when reduced to fine powder, it will be vermilion proper for use: but on the perfectness of the levigation, depends, in a great degree, the brightness and goodness of the vermilion. In order therefore to perform this, it is necessary that two or three mills of different closeness should be employed, and the last should be of steel, and set as finely as possible.”

It is common, perhaps general, for dealers to sophisticate vermilion with red lead. But to detect with certainty the fraud, both with respect to the general fact, and the proportion, use the following means:

“Take a small, but known quantity of vermilion suspected to be adulterated, and put it into a crucible; having first mixed with it about the same quantity, in bulk, of charcoal dust: put the crucible into a common fire, having first covered it with a lesser crucible inverted into it; and give a heat sufficient to fuse lead; when the crucible being taken out of the fire, should be well shaken, by striking it against the ground. If the suspected adulteration has been practised, the lead will be found reduced to its metalline state, in the bottom of the crucible; and, being weighed, and compared with the quantity of cinnabar that was put into the crucible, the proportion of the adulteration may be thence certainly known. But, if no lead be found in the crucible, it may be safely inferred, that no red lead had been commixed with the vermilion.”

NATIVE

NATIVE CINNABAR.

It is found naturally formed in the earth, though seldom so pure as to be fit for the uses of painting, at least without being purified by sublimation. The mistaken notion that it would stand better than vermillion, because it was a natural production, has made it to be coveted by painters who are curious in colours. It is, however, not worth their while to be solicitous about it, as it never excelled the best vermillion in brightness; and what is generally sold for it is a pigment compounded of quicksilver and sulphur.

RED LEAD, *or* MINUM.

The goodness of red lead may be seen by its brightness, and a mixture of any kind will make it of a dull appearance. It is on this account not so liable to be sophisticated as white lead or vermillion. It is lead calcined, till it acquires a proper degree of colour, by exposing it with a large surface to the fire.

SCARLET OKER,

Is an ochrous, earthy, or rather iron substance, and is the basis of green vitriol, separated from the acid of the vitriol by calcination. It is a kind of orange scarlet colour, and rivals any of the native okers, from its certainty of standing, and extreme strength and warmth, either as a ground, or in the shade of carnations. It is useful as a colour in any kind of painting; the manner of its preparation is as follows.

“ Take

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“ Take of green vitriol or copperas, any quantity;
 “ and being put into a crucible, of which it will fill
 “ two thirds, set it on a common fire to boil (taking
 “ care that it do not boil over) till the matter be near-
 “ ly dry; when it will be greatly diminished in
 “ quantity. Fill then the crucible to the same
 “ height again, and repeat the boiling and replenish-
 “ ing, till the crucible be filled with dry matter.
 “ Take it then from this fire, and put it into a wind-
 “ furnace; or, if the quantity be small, it may be con-
 “ tinued in the same fire, the coals being heaped up
 “ round it. Let the contents be calcined there till
 “ they become of a red colour when cold; which
 “ must be examined by taking a little of the matter
 “ out of the middle, and suffering it to cool; for so
 “ long as it remains hot, the red colour will not ap-
 “ pear, though it be sufficiently calcined. When
 “ duly calcined, take the oker out of the crucible
 “ while hot, and put it into water, in which the parts
 “ of the broken crucible may be be soaked likewise
 “ to obtain more easily what shall adhere to them;
 “ and stir the oker well about in the water, that all
 “ the remaining vitriol may be melted out of it. Let
 “ it then settle, and when the water appears clear,
 “ pour it off, and add a fresh quantity; taking out all
 “ the broken pieces of the crucible; and proceed as
 “ before; repeating several times this treatment with
 “ fresh quantities of water. Then purify the oker
 “ from any remaining foulness by washing over;
 “ and having brought it to a proper state of dryness,
 “ by draining off the fluid by a filter, in which the
 “ paper must be covered with a linen cloth, lay it to
 “ dry on boards.”

COMMON

COMMON INDIAN RED,

Is substituted in place of the real kind brought from the East-Indies : serving equally well for common purposes, giving a tint verging to scarlet, (varying from the true Indian red, which is greatly inclined to the purple) and on account of its warm, though not bright colour, it is much used, as well in finer as coarser paintings in oil. It is afforded cheap and may be thus managed.

“ Take of the caput mortuum, or oker, left in the iron pots after the distillation of aquafortis from nitre and vitriol, two parts, and of the caput mortuum or colcothar, left in the long necks after the distillation of oil of vitriol, one part ; break the lumps found among them, and put them into tubs with a good quantity of water ; and having let them stand for a day or two, frequently stirring them well about, lade off as much water as can be got clear from them ; and add a fresh quantity, repeating the same treatment till all the salts be washed out, and the water come off nearly insipid. The red powder which remains must then be washed over, and, being freed from the water, laid out to dry.

“ When this is designed for nicer purposes, it should be washed over again in basons, the gross manner of lading it out of one tub into another not fitting it always completely to such ends.”

VENETIAN RED.

Useful to house-painters in imitating mahogany—and is a native red oker inclining to scarlet, and

G easily

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easily prepared by mixing it with the colcothar or caput mortuum, taken out of the aquafortis pots and washed over. It requires no other preparation for use than to be well ground with oil, unless when it is used in miniature painting—when it should be washed over with the utmost care.

SPANISH BROWN,

Resembles the Venetian red very much in colour, but is fouler: it is a native pigment and used much in the same state nature produces it; being dug up in several parts of England. No other preparation is needful than freeing it well from stones and filth, and grinding it with oil to render it fit for colourmen, in the preparation of cloths for pictures, and other coarse work.

Calcined or burnt TERRA di SIENNA,

Is originally yellow; but when moderately calcined becomes an orange red, though not very bright. It is a native oker, brought hither from Italy in the state in which it is naturally found. It is calcined by putting lumps of it either in a crucible, or naked in a common fire, and continuing it there till the colour be changed from yellow to red. It is exceedingly useful in oil-painting, and admits of no adulteration: it may be distinguished from other ochrous earths by its semi-transparency.

C A R M I N E,

Is a bright crimson colour, of great advantage in painting, as well in water as varnish; the preparation
tion

tion of it is kept a secret by those who prepare it in perfection; and the superiority of the French carmine shews that the proper method is wanting in England—though some wrongly attribute the excellence to qualities in the air and water of France. There are several recipes for this colour, but rather than insert imperfect instructions for an article of great consequence, we choose to be silent.

L A K E.

The best of what is commonly sold is made from the colour extracted from scarlet rags, and deposited on the cuttle-bone, which may be done in the following manner :

“ Take a pound of the best pearl-ashes, and, having dissolved them in two quarts of water, purify them by filtering through paper. Add then to this solution two more quarts of water, and having put in a pound of scarlet shreds, procured of the taylors (which must be entirely clean) boil them in a pewter boiler, till the shreds appear to have wholly lost their scarlet colour. Take them out of the solution and press them well; dipping them after in water and pressing them again, that all the fluid they had imbibed may be got from them, in order to be put back to the rest. Take then another pound of the scarlet shreds, and repeat the like treatment of them in the same solution; as also a third and fourth pound. While this is doing dissolve a pound and half of cuttle-fish-bone in a pound of strong aquafortis in a glass receiver; adding more of the bone, if it ap-

“pear to produce any ebullition in the aquafortis :
 “and, having strained off this solution through
 “flannel, pour it into the other by degrees ; observ-
 “ing whether it produce any effervescence on put-
 “ting in the last quantity : which if it do in any
 “great degree, more of the cuttle-fish-bone must be
 “dissolved in aquafortis ; and the solution very gra-
 “dually added till no ebullition appear to be raised
 “by it in the mixture. If this be properly ma-
 “naged, the fluid will soon become clear and co-
 “lourless, and the tinging particles extracted from
 “the shreds, together with the cuttle-fish-bone,
 “will subside to the bottom and form a crimson
 “sediment ; which is the lake. The water must
 “then be poured off ; and two gallons of hard
 “spring water must be put to the lake, and well
 “stirred about to mix them. This being likewise
 “poured off, after the lake has again settled to the
 “bottom, must be replaced by another two gal-
 “lons ; and the same method must be repeated four
 “or five times. But if hard water cannot be pro-
 “cured, or the lake appear too purple, half an
 “ounce of alum should be added to each quantity
 “of water before it be used. When the lake is thus
 “sufficiently freed from the salts, it must have the
 “water drained from it in a filter covered with a
 “linen cloth, which has been so worn as to have no
 “nap or down remaining on its surface. After the
 “lake has been drained to a proper dryness, it must
 “be dropped on clean boards, by means of a proper
 “funnel : through which, the drops being suffered
 “to pass, and rest on the board at proper distances,
 “they will become small cones or pyramids ; in
 “which form the lake must be suffered to dry, and
 “the preparation is then completed.”

ROSE

ROSE PINK.

The basis of this pigment is principally chalk ; and the tinging substance extracted from brasil, or Campeachy wood. It will not stand with oil or water, and is seldom employed but for the coarse work of house painters, or for paper hanging, unless secured from flying with varnish, when, if good, it may be substituted for lake. It is prepared as follows :

“ Take brasil wood six pounds, or three pounds of
 “ brasil and three of peachy wood. Boil them an
 “ hour with three gallons of water, in which a
 “ quarter of a pound of alum is dissolved. Purify
 “ then the fluid by straining through flannel ; and
 “ put back the wood into the boiler with the same
 “ quantity of alum, and proceed as before ; repeat-
 “ ing this a third time. Mix then the three quan-
 “ tities of tincture together ; and evaporate them
 “ till only two quarts of fluid remain : which eva-
 “ poration must be performed first in the pewter
 “ boiler, and afterwards in a Balneo Mariæ. Pre-
 “ pare in the mean time eight pounds of chalk by
 “ washing over ; a pound of alum being put into
 “ the water used for that purpose, which, after the
 “ chalk is washed, must be poured off and supplied
 “ by a fresh quantity, till the chalk be freed from
 “ the salt formed by the alum ; after which it must
 “ be dried to the consistence of stiff clay. The
 “ chalk and tincture as above prepared, must be
 “ then well mixed together by grinding ; and af-
 “ terwards laid out to dry where neither the sun or
 “ cold air can reach it : though, if it can be con-
 “ veniently done, a gentle heat may be used.”

RED

RED OKER,

Is a native earth, brought chiefly from Oxfordshire, and burnt afterwards (by those who prepare it) in large ovens, till by calcination it becomes red. It is very useful as well in the more delicate as coarser paintings in oil, for it stands infallibly. For nicer purposes it should be washed over; but for others it may be used in the state in which it is found in the shops.

CLASS II.* *Of* BLUE COLOURS.

ULTRAMARINE is a bright blue colour, of the highest value in every kind of painting; being equally serviceable in all, even in enamel. It has a transparent effect in oil, and in some degree in water, and will stand without the least hazard of flying. By reason of its high price, Prussian blue has been much introduced, to the prejudice of painting in general; as the skies of landscapes and many other parts of modern pictures, shew the loss of ultramarine, by their changing from a warm or clear blue, to a faint green or olive teint. The methods have been continually varied by those who have attempted

* CLASS II. BLUE.

Ultramarine.	Indigo.
Ultramarine ashes.	Smalt.
Prussian blue.	Bice.
Verditer.	Litmus, or latmus.
Cendre blue, or Sanders blue.	

tempted to prepare this pigment. The following is the best of the more modern.

“ Take the lapis lazuli, and break it into very
 “ small pieces, or rather a gross powder; put it into
 “ a crucible, and cover it securely, to prevent the
 “ coals from falling amongst it. Calcine it then
 “ with a strong fire, for an hour, if there be any
 “ large quantity, or less time in proportion; and
 “ quench it, when taken out of the fire, in vinegar;
 “ stirring them well together; and suffer it to re-
 “ main in that state for a day or two. Pour off
 “ then the vinegar, except what may be necessary
 “ for moistening the calcined lapis lazuli in grind-
 “ ing; which operation it must then undergo, in
 “ a mortar of flint or glass, till reduced to the great-
 “ est degree of fineness those means may effect.
 “ But, if it appear yet too hard to be easily ground,
 “ give it another short calcination, and quench it a
 “ second time in vinegar. The vinegar must then be
 “ washed off from the powder, by the putting to it
 “ several successive quantities of clean water; each
 “ of which must be poured off when the lapis lazuli
 “ has been well stirred about in them, and is again
 “ settled to the bottom. It must then be ground on
 “ a porphyry stone, with a mullar, till it be perfect-
 “ ly impalpable, and then dried: in which state it is
 “ duly prepared to mix with the following cement.
 “ Take of Burgundy pitch nine ounces—of white
 “ resin, and Venice turpentine, six ounces—of vir-
 “ gin wax one ounce and half—and of linseed oil
 “ one ounce and a quarter; mix them together by
 “ melting in a pipkin over the fire; and suffer them
 “ to boil till they acquire so stiff a consistence, that
 “ being dropt into water while of this boiling heat,
 “ they

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“ they will not spread on the surface of it, but form
 “ a roundish mass or lump. The cement being thus
 “ formed, may be poured out of the pipkin in the
 “ water, and made into cakes or rolls for use. Of
 “ this cement, take an equal weight with that of the
 “ calcined lapis lazuli and melt it in a glazed earthen
 “ pipkin; but not so as to render it too fluid. Then
 “ add to it the calcined matter by very slow degrees;
 “ stirring them together with an ivory spatula, till
 “ the whole appear perfectly mixed. Being thus
 “ mixed, heat the composition to a something greater
 “ degree, and cast it into a large basin full of cold
 “ water. When it has cooled to a consistence to
 “ bear such treatment, knead it well like the dough
 “ of bread, with the hands rubbed over with linseed
 “ oil, till all the parts be thoroughly incorporated
 “ with each other. Then make the mass into a cake,
 “ which may be either kept till some other conveni-
 “ ent time in cold water, or immediately proceeded
 “ with in the following manner: put the cake into
 “ an earthen dish or basin, the bottom of which
 “ should be rubbed with linseed oil, and pour on it
 “ water of the warmth of blood. Let it stand a
 “ quarter of an hour; and, as the water softens the
 “ cake, it will let loose the finest part of the cal-
 “ cined matter, which, on gently stirring the water,
 “ but without breaking the cake, or separating it into
 “ lesser parts, will be suspended in the water, and
 “ must be poured off with it into another vessel.
 “ The quantity of water must be then renewed,
 “ and the same operation repeated a second or third
 “ time: and, as the mass appears slack, in affording
 “ the colour, it must be moved and stirred, in the
 “ manner of kneading, with the ivory spatula, but
 “ not

“not broken into fragments or small parts; and
 “when so much of the colour is extracted, as to
 “render it necessary for the obtaining more, the
 “heat of the water must be increased to the greatest
 “degree. The quantities of the calcined matter
 “(which is now the ultramarine) that were first
 “washed off, and appear of the same degree of deep-
 “ness and brightness, may be put together; and the
 “same of those of the second degree; the last wash-
 “ings making a third. The water being then pour-
 “ed off from each of these parcels, but on a lixivium
 “formed of two ounces of salt of tartar, or pearl-
 “ashes, dissolved in a pint of water, and filtered
 “through paper after the solution is cold. This
 “lixivium must be put on boiling hot, and the ul-
 “tramarine stirred well about in it; and then the
 “mixture set to cool. The powder being subsided,
 “the clear lixivium must be poured off, and clean
 “water put in its place; which must be repeated
 “till the whole of the salts of the lixivium are
 “washed away. The ultramarine must afterwards
 “be dried; and will be then duly prepared for
 “use.”

Ultramarine is subject to be adulterated, on ac-
 count of its great price—this is frequently done by
 a precipitation of copper, made by alkaline salt,
 and is very injurious; because the magistery of cop-
 per (if the ultramarine sophisticated with it be
 used in painting, either with oil or water) will
 change its hue and turn black. And, in enamel
 painting, as soon as fluxed it will become a green,
 and consequently make the effect of the ultrama-
 arine vary from what is intended. This fraud may
 be easily detected by pouring some diluted spirit
 H of

of nitre on a small quantity; which, if there be any copper, will soon dissolve, and form a greenish blue solution.

ULTRAMARINE ASHES.

After the ultramarine has been extracted from the lapis lazuli, the residuum or remains from this pigment. And when the operation of extracting the colour has not succeeded well, a considerable share of the ultramarine is left behind with the increment, and greatly enhances the worth of the ashes; for of course the value of the latter is inferior to the former, but it is still subject to adulteration, which may be discovered by putting some of it into a small quantity of spirit of nitre, and if there be any copper in it, it will be tinged green. It is prepared as follows:

“Take the cement of the ultramarine, which remains after the colour is extracted, and mix it with four times its weight of linseed oil. Let the mixture be set in a glazed pipkin over the fire, and when it is thus boiled a short time, put it into a glass vessel sufficiently large to contain it, of a cylindrical figure: of which vessel the diameter must be small in proportion to the length. But care must be taken, that the matter when put into this glass be cool enough not to endanger the breaking it. This glass must then be put into a balneum mariæ, which must be made as hot as possible without boiling, and kept there till the colour appears to be all subsided to the bottom. The oil must then be poured off, till the colour appears to rise with it; and the remainder, with
II “the

“ the colour in it, must be put into another glass of
 “ the same kind with as much fresh oil as will rise
 “ five or six inches above the colour. This glass
 “ must be treated in the same manner as the first:
 “ observing when the colour has subsided, the oil
 “ must be poured off, and a fresh quantity put in its
 “ place. This having been likewise poured off, the
 “ colour must then be well washed, to free it from
 “ the remaining oil, first in boiling water, and af-
 “ terwards in some of the lixivium abovementioned,
 “ made boiling hot also. As much of the lixivium
 “ being poured off, when the colour has subsided, as
 “ can be separated from it that way, the colour must
 “ be thoroughly freed from the remainder by fre-
 “ quent ablutions with clean water: after which
 “ the water must be taken off by the means above
 “ directed for the ultramarine, till the matter be of
 “ a proper degree of moisture for grinding. It must
 “ then be thoroughly well ground on a porphyry,
 “ and washed over; that all the harder and insuf-
 “ ficiently calcined parts may be reduced to an im-
 “ palpable powder; in order to which, the remain-
 “ ing grosser parts, after the finer have been separated
 “ by the washing over, must be again ground till
 “ the whole be perfectly fine. The same means must
 “ be afterwards used to bring the ashes to a dry pow-
 “ der that were before directed for the ultramarine.”

PRUSSIAN BLUE,

Is the earth of alum, combined with the fixed
 sulphur of animal or vegetable coal; and may be
 made from almost any animal substance; but it is
 generally made of the coal of blood only. It is

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useful in all kinds of painting, save enamel; and prepared to different degrees of brightness and strength. The common kind found in the shops, and sold at very low prices, can be little depended upon in paintings of consequence; therefore it should be prepared perfect, and in the true manner: and then, considering the high price of ultramarine and the foulness of the indigo, it may be deemed an acquisition to the art of painting.

“ Take of blood any quantity; and evaporate it
 “ to perfect dryness. Of this dry blood, powdered,
 “ take six pounds, and of the best pearl-ashes two
 “ pounds: mix them well together in a glass or
 “ stone mortar; and then put the mixt matter into
 “ large crucibles or earthen pots; and calcine it in
 “ a furnace; the top of the crucible or pot being
 “ covered with a tile, or other such convenient
 “ thing, but not luted. The calcination should be
 “ continued, so long as any flame appears to issue
 “ from the matter; or rather till the flame become
 “ slender and blue; for if the fire be very strong, a
 “ small flame would arise for a very long time, and
 “ a great part of the tinging matter would be dissipated and lost. When the matter has been sufficiently calcined, take the vessels which contain
 “ it out of the fire; and, as quickly as possible,
 “ throw it into two or three gallons of water; and,
 “ as it soaks there, break it with a wooden spatula,
 “ that no lumps may remain. Put it then in a proper tin vessel, and boil it for the space of three
 “ quarters of an hour or more. Filter it while hot
 “ through paper in tin cullenders, and pass some
 “ water through the filter when it is run dry, to
 “ wash out the remainder of the lixivium of the
 “ blood and pearl-ashes; the earth remaining in the
 “ filter

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“ filter may be then thrown away. In the mean
“ time, dissolve of clean alum four pounds, and of
“ green vitriol or copperas two pounds, in three gal-
“ lons of water. Add this solution gradually to the
“ filtered lixivium, so long as any effervescence
“ appear to arise on the mixture; but, when no
“ ebullition or ferment follows the admixture, cease
“ to put in more. Let the mixture then stand at
“ rest, and a green powder will be precipitated:
“ from which, when it has thoroughly subsided, the
“ clear part of the fluid must be poured off, and
“ fresh water put in its place, and stirred well about
“ with the green powder; and, after a proper time
“ of settling, this water must be poured off like the
“ first. Take then of spirit of salt double the
“ weight of the green vitriol which was contained
“ in the quantity of solution of vitriol and alum,
“ added to the lixivium, which will soon turn the
“ green matter to a blue colour; and, after some
“ time, add a proper quantity of water, and wash
“ the colour in the same manner, as has been di-
“ rected for lake, &c. and, when properly washed,
“ proceed in the same manner to dry it in lumps of
“ convenient size.”

The brightness, deepness, and coolness of Prussian blue, are proofs of its goodness—for with these qualities it may be depended upon in standing well. Sophistication, or any thing amiss in the process, may be seen by its being more foul and purple.

V E R D I T E R,

Is formed by adding a due proportion of chalk to a solution of copper, made by refiners in precipitating the silver from the aquafortis, in the operation

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ration called parting. Verditer is to be had at a cheap rate from the refiners, who are at no expence in making it, but that of the chalk and labour. The manner in which it may be best done by them is as follows :

“ Take any quantity of chalk, and having rendered it sufficiently fine by washing over carefully, add it gradually to the solution of copper, so long as any change appears to be produced by it from the ebullition excited ; or the due proportion may be perceived by the fluid losing its green tinge and becoming colourless. Let it then stand at rest till the sediment be subsided, and pour off the clear part of the fluid from the powder ; adding in its place clean water, which must be several times renewed till the salts be entirely washed out. The sediment, which is the verditer, must be afterwards freed from the fluid by filtering through paper covered with a cloth, and laid out in lumps of a middling size to dry.”

Those who desire to make verditer themselves, may prepare the solution of copper, by adding copper filings gradually to aquafortis of any kind, or putting plates of copper in it ; and then proceeding as is above directed for the refiners solution.

BLEU *de* CENDRES ; or SANDERS BLUE.

If enquiry is made at the colour shops for this article, nothing is to be found under the name but common verditer ; or a species of it where the precipitation of the copper appears to be made in part upon starch as well as chalk. It may be prepared as follows :

“ Take

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“ Take of the refiners solution of copper made in
“ the precipitation of silver from the spirit of nitre ;
“ or dissolve copper in spirit of nitre or aquafortis,
“ by throwing in filings or putting in slips of copper
“ gradually, till all effervescence cease. Add to it of
“ starch finely powdered, the proportion of one
“ fifth or sixth of the weight of the copper dissolved.
“ Make then a solution of pearl ashes, and filter it ;
“ and put gradually, to the solution of copper, as
“ much as will precipitate the whole of the copper ;
“ which may be known by the fluid's becoming
“ clear and colourless, though before highly tinged
“ with green. Wash the powder, which will be
“ precipitated, in the manner directed for lake, &c.
“ and, when it is so well drained of water by means
“ of a filter, as to be of a proper consistence, grind
“ the whole well together, and lay it out to dry.”

I N D I G O.

This was formerly almost the only blue colour used in painting. It is made in the Spanish West-Indies, by means of putrefaction from certain plants, and a coagulation by the air. It cannot (as far as is hitherto known) be prepared in these colder climates, on account of the tender nature of the plants which produce it. The indigo brought from the French, or our own plantations, is foul, and greatly inferior in brightness to that formerly imported hither from the Spaniards, it being equal to the prussian blue for some purposes ; and there is no other preparation necessary to using it in painting, except a perfect levigation.

S M A L T.

S M A L T.

Smalt is made from glass ground to a powder, and coloured with zaffer; or prepared from fluxing to the proportion of glass, one seventh part of zaffer, or more or less according to the degree of deepness required. It will not work with either brush or pencil, but by strewing it upon any ground of oil-paint while wet, it makes a bright blue shining surface, proper for large sun-dials, and other such applications. In enamel-painting, and in painting on glass, it is of great use.

B I C E.

At present several compositions of indigo and verditer with chalk, and other cheap substances, are sold in this name; but the true kind is smalt, reduced to a fine powder by levigation. From its unsuitable texture, it is now greatly disused, or it makes a light warm blue colour, and was formerly used in oil, but more frequently in water-colours.

L I T M U S or L A T M U S.

Water painting is the only kind in which this can be used, and as it is brought from Holland at a very cheap rate, it were almost needless to give the preparation. But if any are desirous, for curiosity, to know the process, it is formed from archal, a species of moss, brought from the Canary and Cape de Verd Islands, and prepared as follows. "Add quick lime
"and putrified urine, or spirit of urine distilled from
"lime

“lime, to the archal, previously bruised by grinding.
 “This mixture must be suffered to stand till it acquire a very blue colour. After which the fluid
 “must be suffered to evaporate, and the remaining mass, when it is of the consistence of a paste,
 “must be laid on boards to dry in square lumps.”

If it is used in miniature paintings, care must be taken of the approach of acid, for that changes it instantly from blue to red; though it will stand if no such accident intervene.

CLASS III.* OF YELLOW COLOURS.

KING'S yellow, when prepared well (which must be done by mixing sulphur and arsenic by sublimation) is an extremely bright colour, and a true yellow; but when mixed with white lead, and several other pigments, its colour flies or changes: this defect, joined to its nauseous smell, and the notion of its being a strong poison, renders it unpleasing, and causes it to be rejected by many. Nevertheless, it may be used on many occasions, with great advantage, not only as a yellow, but by mixing it with blue pigments, and forming a green. King's yellow is prepared as follows:

* CLASS III. YELLOW.

King's yellow.
 Naples yellow.
 Yellow oker.
 Dutch pink.
 English pink.
 Light pink.
 Gamboge.
 Masticot.

Common orpiment.
 Gall stones.
Terra di Sienna unburnt.
 Turpeth mineral.
 Yellow berry wash.
 Turmeric wash.
 Zedoary wash.
 Tincture of saffron.

I

“Take

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“ Take of arsenic powdered, and flowers of sulphur, in the proportion of twenty of the first to one of the second: and having put them into a sublimmer, sublime them in a sand heat. The operation being over, the king's yellow will be found in the upper part of the glass; which must be carefully separated from any caput mortuum, or foul parts that may be found in the glass with it. It must be afterwards reduced to an equal powder by levigation.”

NAPLES YELLOW.

The neighbourhood of Naples is said to produce this pigment naturally: of the truth of this we are dubious, but certain that it is brought from abroad. It is a yellow rather inclining to the orange; seldom used but in oil painting, where it is generally found to stand well. It is brighter than other yellows at present in use, except the king's yellow; but if it touch iron along with the least watry moisture, it will be changed by it, for which reason care should be taken to employ an ivory spatula, instead of a pallet knife, during the grinding of it with oil, which is the only preparation practised on it, as it does not well bear levigation with water.

YELLOW OKER.

The substance of this is a mineral earth, found in different places, of various degrees of purity. There is no other preparation necessary but levigation, and freeing it properly from dirt and other matter. It is a valuable colour; being a true yellow

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low that will not fly in the least, and its texture suits it for all kinds of painting. Notwithstanding its utility it ought to be of low price.

DUTCH PINK.

As this colour will not bear well to be worked in oil, nor can be depended upon with regard to its standing, it is used principally for coarser purposes in water; and is sometimes prepared in the same manner with starch and white lead: but the following preparation is very cheap and easy, and makes it to perfection:

“Take of French berries one pound, and of turmeric root powdered four ounces; boil them in a gallon of water two hours, and then strain off the tincture through flannel, and boil it again with an ounce of alum till it be evaporated to one quart. Prepare in the mean time four pounds of chalk, by washing it over, and afterwards drying it, and mix the chalk with the tincture, by grinding them together; and then lay out the Dutch pink thus made to dry on boards.”

As it should be a full gold coloured yellow, and very bright, any adulteration may be discovered by the eye.

ENGLISH PINK.

Prepare this in the same manner, and with the same ingredients as the Dutch, only increasing the quantity of chalk, to render it of an inferior quality; it being the same, only lighter and coarser.

LIGHT PINK.

The only kind fit for use in oil painting is prepared in the following manner :

“ Take of French berries one pound, boil them
 “ with a gallon of water for an hour : and having
 “ strained off the fluid, add to it two pounds of
 “ pearl ashes, dissolved and purified by filtering
 “ through paper. Precipitate with alum dissolved
 “ in water, by adding the solution gradually, so
 “ long as any ebullition shall appear to be raised in
 “ the mixture. When the sediment has thoroughly
 “ subsided, pour off the water from it, and wash it
 “ with several renewed quantities of water, pro-
 “ ceeding as has been before directed in the case of
 “ the lake, &c. drain off the remaining fluid in a
 “ filter with a paper covered with a linen cloth ;
 “ and, lastly, dry it on boards in small square
 “ pieces.”

GAMBOGE.

No yellow is of greater service in water colours ; easily dissolving to a milky consistence, from the state in which it arrives. It is a gum produced in the East Indies, and nothing but the addition of water is wanting to prepare it for use.

MASTICOT.

As this is not a very bright colour it is little used ; or it will stand perfectly in oil or in water ; it works with the pencil better than most other pigments,

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ments, and certainly might be made very useful by putting flake white, or white lead, on an earthen or stone dish before a strong fire; and continuing it there till the colour be sufficiently yellow. The calcination being finished, the parts which are of the desired tint must be picked out from the rest and put together. For with the greatest care, it is difficult to calcine the whole equally. Grinding with oil is all the further preparation necessary to the using of it.

COMMON ORPIMENT.

It is generally disagreeable to meddle with this, on account of its nauseous smell and poisonous quality; being a fofile body composed of arsenic and sulphur, with a mixture frequently of lead, and sometimes other metals. In its unrefined state it is only useful to colour the matted bottoms of chairs, or other coarse work; and if purified by sublimation it becomes king's yellow.

GALL STONES.

The real kind are found in the gall bladder or like ducts of beasts; and require nothing more than rubbing with water (as gamboge) to dissolve them to a dark warm yellow.—But as these are not always to be procured, a fictitious kind, of equal service, may be made as follows:

“Take a quart of the bile of oxen, as fresh as possible. Put it into a proper pewter vessel, and
“set it to boil in a balneo mariæ; having added to
“it a quarter of an ounce of clear gum arabic.
“Evaporate

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“Evaporate the whole to about an eighth; and
“then remove it into a china cup or basin of proper size, and evaporate it to dryness; collecting
“it into a mass as it becomes of a stiff consistence.”

TERRA *di* SIENNA *unburnt*.

Mention has been made of this pigment being a native ochrous earth, brought from Italy; that calcination changes it from yellow to red—therefore those that choose to use it as a yellow, should take care to have it extremely well levigated, and it will serve as a deeper shade by many degrees than any of the other okers, and of a superior brightness.

TURPETH MINERAL.

This for use is much such another colour in yellow as vermillion in red, and will stand equally well with that. It is a preparation of mercury, by calcining it together with oil of vitriol, and is much brighter than any other yellow used in oil except king's yellow. The preparation:

“Take of pure quicksilver, and oil of vitriol,
“each six pounds. Put them into a retort; to
“which, being placed in a sand bath, fit on a receiver; and distil them with a strong fire, while
“any fumes appear to rise into the receiver; urging
“it at last with as great a heat as the furnace will
“bear. When the retort is again cold, remove it
“out of the sand bath; and having broken it, take
“the white mass, which will be found at the bottom of it, and break it to a gross powder; and
“having put it in a glass mortar, pour water on it;
“which will immediately convert it to a yellow
“colour.

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“ colour. Let it then be thoroughly ground in this
“ mortar, with water, and afterwards washed with
“ several successive quantities. It must then be
“ thoroughly well levigated on a stone, and dried.”

The YELLOW WASH, from the French berries.

“ Take a pound of the French berries, and put to
“ them a gallon of water, with half an ounce of
“ alum: boil them an hour in a pewter vessel, and
“ then filter off the fluid, through paper if it be
“ designed for nicer purposes, or flannel for more
“ ordinary. Put them again into the boiler, and
“ evaporate the fluid till the colour appear of
“ the strength desired; or part may be taken out
“ while less strong, and the rest evaporated to a pro-
“ per body.”

It may be used in water as a washing colour, and is applicable to many material purposes, as it may be made of almost any degree of deepness.

TURMERIC WASH.

The gum made from the turmeric-root dissolved in water, serves for the same purposes of the yellow-berry-wash—but to procure a bright tincture, it must be dissolved in spirit of wine instead of water, by the following method.

“ Take two ounces of proof spirit, and add to it
“ one ounce of water. Being put into a proper
“ phial, add two drams of turmeric root in powder.
“ Shake them well together, and then let them stand
“ three or four days, repeating the shaking as often
“ as convenient; and a strong tincture will be thus
“ obtained.”

TINCTURE

TINCTURE *of* SAFFRON.

It makes a good shade for gamboge or other light bright yellows : by pouring hot water on the best English saffron in a proper phial or other vessel ; which should be placed for some time in a heat next to that which would make water boil ; and the tincture should then be filtered from the dregs through a piece of linen cloth.

ZEDOARY WASH.

Take an ounce of zedoary-root, and boil it in a quart of water till the water appear sufficiently tinged to a yellow : strain it through linen and it will be a stronger colour than can be made of turmeric without spirits of wine, and is valuable for many purposes in painting with water colours, as flowers, yellow draperies, &c.

CLASS IV.* *of* GREEN COLOURS.

VERDIGRISE.

Let the pulp of grapes or any such acid remain upon copper ; and the rust formed by its corrosive action is verdigrise. It is brought from France and Italy hither, and makes a blue-green colour in paint ; but will not stand in oil. It should have a small admixture of yellow to render it a true green.

CHRYSTALS

* CLASS IV. GREEN.

Verdigrise.	Prussian green.
Distilled verdigrise, or chrystals	Terra verte.
of verdigrise.	Sap green.

CHRYSTALS of VERDIGRISE; *called*
DISTILLED VERDIGRISE.

" Take of the best verdigrise four ounces, and of
 " distill'd vinegar two quarts. The verdigrise being
 " well pounded, let them be put into a circulating
 " vessel, that may be formed of a mattrafs (which is a
 " round bodied glafs with a long straight neck) and a
 " Florence flask; which must have its neck inverted
 " into the mattrafs, the thick end being broken off.
 " This circulating vessel must be placed in a gentle
 " sand-heat, or other warm situation, where it must
 " continue, being frequently shaken, till the vinegar
 " has dissolved as much as it can of the verdigrise.
 " Remove the verdigrise and vinegar then into a pro-
 " per glafs for decanting the fluid, when it shall be-
 " come clear from the sediment: and when it has
 " stood a due time to settle, let it be carefully poured
 " off and evaporated to about half a pint; which is
 " best done with a sand heat, in a glafs body or cu-
 " curbit, having its neck cut off to form a wide mouth.
 " It may be set to shoot in the same vessel, or in a
 " glafs receiver with a wide neck; and when the
 " chrystals are formed, they must be taken out and
 " carefully dried in the shade.

" A fresh proportion of vinegar may be added to
 " the remains of the verdigrise; and at the same
 " time the first quantity left undissolved; and the
 " mothers, or fluid remaining after the chrystals
 " were formed, may be put into it; by which means,
 " the other parts of the process being repeated, a
 " second quantity of the chrystals may be obtained."

The chrystals made thus are of a bright green co-
 lour, and if used with varnish so as to stand, have

K

a fine

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a fine effect: but they will not hold their colour very well in oil, being apt to turn black.

S A P G R E E N,

Is made of the juice of buckthorn berries, and is very useful in water painting as a washing colour, making a strong and pretty deep stain. It is prepared as follows:

“Take any quantity of buckthorn berries before
 “they be ripe, and press out the juice in such a
 “press as is used for making cyder or verjuice; or
 “by any other method. Strain this juice through
 “flannel; and then let it stand to settle; and when
 “it has stood a proper time, decant off the clearer
 “part of the fluid from the sediment. Put this juice
 “into a stone or earthen vessel; and evaporate it
 “till it begins to grow of a thick consistence; then
 “remove it into a pewter vessel, and finish the
 “evaporation in a balneo mariæ, collecting the mat-
 “ter into one mass as it acquires a proper con-
 “sistence.”

P R U S S I A N G R E E N.

This colour is much neglected, and seems almost wholly laid aside, or it has nearly all the uses in its colour, that the Prussian blue has, only not so bright; nor will stand so well; yet it might be of advantage in many kinds of painting. To make it,

“Proceed in all points, as in the process given
 “for the Prussian blue, till the solution of alum
 “and vitriol be mixed with that of the pearl ashes
 “and sulphur of the coal, and the green precipitation
 “made. Then, instead of adding the spirit of salt,
 “omit any further mixture, and go on to wash the
 “sediment,

“sediment, which is the Prussian green; and afterwards to dry it, in the same manner as is directed for the blue.”

TERRA VERTE.

This is supposed to be a native earth, brought from abroad, of a coarse texture, requires to be well leevigated and washed over; but no other preparation is necessary previous to its use.

CLASS V.* OF PURPLE COLOURS.

The true INDIAN RED.

PERHAPS it may be no easy matter to procure this colour true; for it is a native ochrous earth, very useful in oil, in its compounded state, as well for force in its effect as certainty of standing. But the fictitious kind, now fallaciously called by its name has no good property as a purple: in short, it is varied into a broken orange, and rejected by most colourmen and painters. The true kind needs no other preparation than grinding or washing over.

ARCHAL, or ORCHAL.

This may be made in a very easy manner by those who cannot procure it of the manufacturers; and is an extreme bright purple fluid, but apt to dry to a reddish brown, and therefore much disused at present.

“Take an ounce of the archal weed or moss, as it is sold at the dry-salters; and having bruised it well, put it into a glass phial with half a pint of

K 2 “weak

* CLASS V. PURPLE.

True Indian red. Archal, or orchal.

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“ weak spirit of sal ammoniacus distilled with lime.
“ Stop the phial close, and leave the archal to in-
“ fuse till a strong bluish purple tincture be formed.”

CLASS VI.* OF BROWN COLOURS.

BROWN PINK.

Among the variety of methods for preparing this pigment, the following is one of the best :

“ Take of French berries one pound; of fustic
“ wood in chips half a pound, and of pearl ashes
“ one pound. Boil them in a tin boiler, with a gal-
“ lon and a half of water, for an hour; and then
“ strain off the tincture through flannel while the
“ fluid is boiling hot. Having prepared, in the
“ mean time, a solution of a pound and a half of
“ alum, put it gradually to the tincture, so long as
“ an ebullition shall appear. Proceed then to wash
“ the sediment as in the manner directed for the
“ lakes; and being brought, by filtering through
“ paper with a linen cloth, to a proper consistence,
“ dry it on boards in square pieces.”

Its goodness may be judged of by its transparency, in every quality but that of standing; which can only be known on trial.

B I S T R E.

This colour is extremely serviceable in water, if procured good, which may be done by the following recipe :

“ Take

* CLASS VI. BROWN.

Brown pink.	Terra japonica, or japan earth.
Bistre.	Umbre.
Brown oker.	Asphaltum.
Cologn, or Collin's earth.	Spanish juice, or extract of liquorice.

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“ Take any quantity of foot of dry wood, but let
“ it be of beech wherever that can be procured.
“ Put it into water in the proportion of two pounds
“ to a gallon ; and boil them half an hour. Then,
“ after the fluid has stood some little time to settle,
“ but while yet hot, pour off the clearer part from
“ the earthy sediment at the bottom ; and if, on
“ standing longer, it form another earthy sediment,
“ repeat the same method : but this should be done
“ only while the fluid remains hot. Evaporate then
“ the fluid to dryness, and what remains will be good
“ bistre, if the foot was of a proper kind.”

BROWN OKER.

After procuring this substance of fofile earth from the colourmen, which may be done at a very low price, care should be taken to have it well levigated and washed over ; when it may be used for a foul orange colour, and may be depended on for standing well.

COLOGN, or COLLIN'S EARTH.

Where the fore ground of a water painting requires to be pretty strong, the Cologn earth may be used to advantage. It requires no preparation, save grinding perfectly fine with water ; it being of a fofile substance, and a dark blackish brown colour.

TERRA JAPONICA, or JAPAN EARTH.

A full brown colour is produced from this gummy substance, by dissolving it with water ; but it will not mix well with oil. It is extracted from some kind of vegetable, and its goodness may be distinguished by the clearness of its colour.

UMBRE.

*Dark
Blackish
Brown
Yellow*

U M B R E.

It has the quality of the other ochrous earthy substances, joined to that of drying better, which occasions it to be much used in making drying oils, japaner's gold size, and the black oil lacker. In painting some few use it with water; but before it is fit for that purpose it should be burnt, levigated and washed over.

A S P H A L T U M.

There is an additional advantage in this colour, when used in lieu of brown pink: It is secure from flying, and retains in drying a transparent brown. If it can be procured pure as it is found in the earth in Asia, it is certainly very useful; but it is a bituminous matter, of a consistence like tar, and liable to be adulterated with turpentine and other cheap balsamic substances; which fraud is not easy to be detected, unless by the mixture taking off the native transparent, and deep brown colour, which the eye may discover.

SPANISH JUICE, *or* EXTRACT *of* LIQUORICE.

The liquorice root is extracted by a decoction in water, and then evaporated to a well known consistence. In miniature painting it is at this time much used. It supplies the place of bistre in a great measure, though it is inferior; but there is no trouble in procuring, nor process in preparing the liquorice that is ever wanted in England.

CLASS VII.* *Of* WHITE COLOURS.

WHITE FLAKE is brought here from Italy; it is used for oil or varnish painting, where a very clean white is required; and is a kind of cerufs or lead corroded by acid.

There is a great deal sold at the colour shops ready prepared; that is, the true kind levigated, mixed with starch or some such substance. But it is best to procure the white flake in a lump, and then levigate it, and if it is thought proper, add any quantity of starch in the grinding, that may render it suitable to work with.

WHITE LEAD,

Is a corrosion by acid from plates of lead, prepared by those who are concerned in it at a low price. It is much employed in common purposes of painting, and may be used in nicer; but will require washing over, and then it is inferior to flake white. Notwithstanding its cheapness, it is frequently adulterated by the makers or wholesale dealers, by adding chalk or powdered talc, which may be seen by comparing a pure piece with a suspected one; as the fraud will appear by the difference of the weight. But to prove it more exactly use the following means:

“Take an ounce of the white lead suspected;
 “and mix it well with about half an ounce of
 “pearl ashes, or of any fixed alkaline salt, and
 “about

* CLASS VII. WHITE.

White flake.	Pearl white.
White lead.	Troy white.
Calcined hartshorn.	Egg-shell white.

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“about a quarter of an ounce of charcoal dust:
“and having put them into a crucible, give them a
“strong heat. The lead will by this means be re-
“duced to its metallic state: and being weighed,
“will shew, by what it may fall short of the
“weight of an ounce, the proportion of the adul-
“teration; about a tenth part being allowed for
“the corroding acid which formed part of the
“white lead.”

CALCINED, *or* BURNT HARTSHORN.

“Take horn, or bones, and burn them in any
“common fire till they become a coal, or are cal-
“cined to some degree of whiteness. Then, having
“freed them carefully from any coal or filth, reduce
“them to a gross powder; and put them upon a
“vessel made in form of a common earthen dish, of
“ground crucibles and Stourbridge clay, and well
“dried; and procure this to be placed in a tobacco-
“pipe-maker's or potter's furnace, during the time
“they keep their pipes or pots in the fire. The
“earth of the horn or bones being thus thorough-
“ly calcined, it must be very well levigated with
“water; and it will be yet further improved by
“being carefully washed over.”

This is a pure white, nor will change by either
air or time: for the nicest purposes it is much used
in water painting, and will not turn black in the
manner flake white and white lead sometimes will.
It is therefore preferred by the more experienced
painters.

PEARL WHITE,

Is prepared by drying or calcining oyster shells at
a fire, and taking that part of the powder that is
of

THE ARTIST'S ASSISTANT. 81

of a perfect whiteness, levigating it well on a stone, and washing it over. It is serviceable in miniature painting.

TROY WHITE, *or* SPANISH WHITE,

May be used in water colours, from the following preparation :

“ Take a pound of chalk, and soak it well in water. Then wash over all the fine part ; and having poured off the first water, add another quantity, in which two ounces of allum is dissolved. Let them stand for a day or two, stirring the chalk once in six or eight hours. Wash then the chalk again over, till it be rendered perfectly fine ; and pour off as much of the water as can be separated from the chalk by that means, taking off the remainder of the dissolved allum, by several renewed quantities of fresh water. After the last water is poured off, put the chalk into one of the cullender filters, with a linen cloth over the paper ; and when the moisture has been sufficiently drained off from it, lay it out in lumps to dry on a proper board.”

EGG-SHELL WHITE,

Is made of the clear shell when the inner skin is peeled off, levigated to powder of a proper fineness, and washed over. It is used by some in water colours, and preferred to flake white.

CLASS VIII. *Of* BLACK COLOURS.

LAMP BLACK.

There is no other preparation than procuring it good, from burning oil in a confined place, and collecting

L

lecting

leſting the foot. It mixes well either with oil or water, and is eſteemed as the principal black in all nicer kinds of painting.

I V O R Y B L A C K .

“Take plates, chips, or ſhavings of ivory; and
 “ſoak them in hot linſeed oil; or, if filings are to
 “be more eaſily procured, they may be uſed moiſten-
 “ed with the hot oil. Put them into a veſſel which
 “will bear the fire; covering them with a ſort of
 “lid made of clay and ſand; which ſhould be dried,
 “and the cracks repaired before the veſſel be put into
 “the fire. Procure this veſſel to be placed in a to-
 “bacco-pipe-maker's or potter's furnace, or any
 “other ſuch fire; and let it remain there during one
 “of their heats. When it ſhall be taken out, the
 “ivory will be burnt properly; and muſt be after-
 “wards thoroughly well levigated on the ſtone with
 “water; or it ſhould, indeed, to have it perfectly
 “good, be alſo waſhed over.”

It is not ſo much uſed as lamp black, owing, per-
 haps, to its drying ſlowly in oil, or to the frequent
 adulterations with charcoal duſt, which renders it
 of a blue caſt; otherwiſe it is, if genuinely pre-
 pared from the ivory, a full clear black, and ex-
 tremely ſerviceable.

I N D I A N I N K .

The true Indian ink is imported from China, and
 is of a conſiſtence, when diſſolved with water, ex-
 tremely well adapted to the pencil. It is much
 uſed in miniature painting, and drawings of ſmall
 kinds. There is a ſort frequently ſold for it made as
 follows :

“Take

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“Take of isinglass six ounces; reduce it to a size, by dissolving it over the fire in double its weight of water. Take then of Spanish liquorice one ounce: and dissolve it also in double its weight of water; and grind up with it an ounce of ivory black, prepared as above directed in p. 82. Add this mixture to the size while hot; and stir the whole together till all the ingredients be thoroughly incorporated. Then evaporate away the water in a balneo mariæ, and cast the remaining composition into leaded moulds greased; or make it up in any other form.”

The preceding are the chief of the substances there will be occasion to mention in drawing and painting; but crayon and enamel colours will be treated of in their places.

Of PAINTING.

PAINTING is the art of representing on a flat superficies, by the duct of draught, and the degrees of colours, all sorts of visible objects.

This definition contains three things, viz. the draught, the colours, and the composition; and though this last part does not appear expressed in a very clear manner in this definition, it can, notwithstanding, be understood by these last words, visible objects, containing the matter of the subjects, which the painter proposes to represent.

The composition contains two things, viz. the invention and the disposition. By the invention, a painter must find and introduce into his subject, the
L 2 objects

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objects which he judges most proper to express and adorn it. And by the disposition, he must place them in a manner, the most advantageous to draw a grand effect from them, and to please the eye in shewing beautiful parts.

For the draught.—A painter must do it correctly, with a good taste, well diversified, sometimes heroic, and sometimes rural, according to the character of the figures he wants to introduce.

The attitudes are to be natural, expressive, varied in their actions, and contrasted in their members: They ought to be simple or noble, animated or moderated according to the subject of the picture, and the discretion of the painter.

Attitude, in painting, is the posture or gesture of a figure, or the disposition of its parts, by which we discover the action it is engaged in, and the very sentiment supposed to be in the mind of the person represented.

The expressions must be just to the subject; the principal figures having noble and sublime ones, and keeping a medium between the exaggerated and insipid.

Expression in painting, denotes a natural and lively representation of the subject, or of the several objects intended to be shewn. The term expression is ordinarily confounded with that of passion; but they differ in this, that expression is a general term, implying a representation of an object, agreeable to its nature and character, and the use or office it is to have in the work; whereas passion in painting denotes a motion in the body, accompanied with certain dispositions, or airs in the face, which mark an agitation in the soul; so that every
passion.

passion is an expression, but not every expression a passion.

The extremities, I mean the head, feet, and hands, must be worked with more precision and exactness than all the rest, and must concur together, to render the action of the figures more expressive.

The draperies must be well ordered, the folds or plaits thereof large, in small number as much as possible, and well contrasted; the stuffs thick or light, &c. according to the quality and conveniency of figures.

Drapery in painting, is the representation of the garments, or cloathing of human figures.

Animals must be principally characterized by an ingenious and special touch.

A landskape ought not to be cut by too many objects; they should be few, but well chosen; and in case a great quantity of objects be introduced in it, they must be ingeniously grouped with lights and shadows; the sight well bound and free; the trees different in form, colour and touch, as much as prudence and the variety of nature require it. That touch should be always light; the fore parts of the landskape rich, either by the objects, or by a greater exactness of work, which render the things true and palpable: the sky is to be light, and no object on the ground ought to dispute with its æthereal character, except smooth waters, and polished bodies, which are susceptible of all colours opposed to them; of celestial, as well as terrestrial ones: the clouds must be well chosen, well touched, and well placed.

Group in painting, is an assemblage or knot of two or more figures of men, beasts, fruits, or the like,
which

which have some apparent relation to each other. In a good painting, it is necessary that all the figures be divided into two or three groups, or separate collections. Such and such a thing make a group, with such and such other of different nature and kind. The antique Laomedon is a fine group, of three beautiful figures.

The perspective must be regular, and not of simple practice, very little exact.

In the coloris, which includes two things, the local colour, and the clair-obscur.

The local colour is nothing else but that, which is natural to each object, in what place soever it be found.

The clair-obscur, is the art of distributing advantageously the lights and shadows, as well on the particular objects, as in the whole of the picture: on the particular objects, to give them a convenient relieve and roundness: and in the whole of the picture, that the objects may be seen in it with pleasure; by giving occasion to the sight to rest itself from space to space, by an ingenious distribution of grand clairs, and large shadows, which afford one another mutual succours, by their oppositions; so that the great clairs are rests for the great shadows; as the great shadows will be rests for the great clairs.

In the description of colours there must be an accord, which may produce the same effect for the eyes, as music does for the ears.

If there be several groups of clair-obscur, in a picture, one of them must be more sensible than the rest, so that there may be unity of object, as in the composition there is unity of subject.

As to the pencil, it must be bold, and light, if possible; but whether it appears smooth, like that of Corregio,

regio, or uneven and rough, like that of Rembrant, it should be always soft.

As to licences, if one is forced to take any, they must be imperceptible, judicious, advantageous, and authorised; the three first are for the art of the painter, and the last regards history.

The invention, which is an essential part of the art, consists only in finding the objects which must enter the picture, according to the imagination of the painter, false or true, fabulous or historical.

As to the composition.—Some have confounded the first part of painting with the genius, others with a fertility of thoughts; and others with the disposition of objects; but all those things are different from one another. I thought that to give a clear idea of the first part of painting, I should call it composition, and divide it into two, viz. invention and disposition. The invention finds only the objects of the painting; and the disposition places them.

The invention is formed by reading in the subjects extracted from history or the fable. It is a pure effect of the imagination in metaphorical subjects; it contributes to the fidelity of the history, as to the clearness of the allegories; and in what manner soever it is used, it must never keep the mind of the spectator in suspense by any obscurity.

As to the design, which I consider as the second part of painting.

The qualities or conditions required in a design are correctness, good taste, elegance, character, diversity, expression, and perspective.

Correctness depends principally on the justness of the proportions, and a knowledge of anatomy.

Taste,

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Taste, is an idea or manner of designing, which arises either from the complexion and natural disposition, or from education, one's master, studies, &c. Elegance gives the figure a kind of delicacy, which strikes people of judgment, and a certain agreeableness which pleases every body. The character is what is peculiar to each thing, in which there must be a diversity; in as much as every thing has its particular character to distinguish it. The expression is, as already observed, the representation of an object according to its character, and the several circumstances it is supposed to be in. The perspective is the representation of the parts of a painting or figure, according to the situation they are in, with respect to the point of sight.

The principal rules that regard the design are; that novices accustom themselves to copy good originals at first sight; not to use squares in drawing, for fear of stinting and confining their judgment; to stay till they can design well after the life, before they begin the practice of perspective rules; in designing after the life, to learn to adjust the bigness of their figures to the visual angle, and the distance of the eye from the model or object; to mark it at all the parts of their design, before they begin to shadow; to make their contours in great pieces, without taking notice of the little muscles and other breaks; to make themselves masters of the rules of perspective; to observe every stroke as to its perpendicular, parallel, and distance; and particularly so to compare and oppose the parts that meet upon, and traverse the perpendicular, as to form a kind of square in the mind; which is the great, and almost the only rule of designing justly; to have a regard

regard not only to the model, but also to the part already designed; there being no such a thing as designing with strict justness, but by comparing and proportioning every part to the first, &c.

As to attitudes.—In them the ponderation and contrast are founded in nature. It performs no action without shewing those two parts; and was it to fail in it, it would be either deprived of motion, or constrained in its action.

As to expressions.—They are the touch-stone of the judgment of the painter: he shews by the justness wherewith he distributes them, his penetration and discernment.

As to the extremities, viz. the head, feet and hands, must be more finished than any other things.

As to draperies.—It is said in painting, to throw a drapery, or give a drapery, instead of cloathing a figure. Draperies are not to be set in form, as our cloaths are; but the plaits must be found as by chance round the members, that they may make them appear such as they are; and by an industrious artifice, contrast them in shewing them, and caress them, by their tender sinuosities and softness.

As to the landskape.—This kind of painting contains an abridgment of all the others; the painter who practises it, must have an universal knowledge of the parts of his art, if not in so great a detail as those who commonly paint history, at least speculatively, and in general. And if he does not finish all the objects in particular, which compose his piece, or accompany his landskape, he is obliged at least, to express in a lively manner, the taste and character thereof; and to give the much more spirit to his works, that it is less finished.

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Let

Let a landscape be ever so well finished, if the comparison of the objects does not render them valuable, and preserve their characters, if the sites be not well chosen, or are not supplied by a fine intelligence of the clair-obscur, if the touches be not judicious, if the places be not animated by figures, animals, or other objects, which are most commonly in motion, and if the truth and variety of nature be not joined to the good taste of the colour, and to the extraordinary sensations, the painting will never gain a reputation among connoisseurs.

As to perspective.—Some authors have imagined that perspective and painting were the same thing, because there was no painting without perspective. Though the proposition is false, absolutely speaking, since the body, which cannot be without shadow, is not, notwithstanding, the same thing with the shadow; but however it is true, in that sense, that a painter cannot do without perspective, and that he does not draw alike, nor give a stroke of his pencil, without perspective having some part in it, at least habitually.

The colouring in its general sense, takes in whatever relates to the nature and union of colours; their agreement, or antipathy; how to use them to advantage in light and shadow, so as to shew a relieve in the figures, and a sinking of the ground; what relates to the æriel perspective, i. e. the diminution of colours by means of the interposition of air; the various accidents and circumstances of the luminary and the medium; the different lights, both of the bodies illuminating, and illuminated; their reflections, shadows, different views, with regard either to the position of the eye, or the object;

what

what produces strength, boldness, sweetness, &c. in paintings well coloured: the various manners of colouring both in figures, landscapes, &c.

As to the pencil.—Here the word pencil signifies only the manner of using it in the application of colours; and when those same colours have not been too much agitated, and as it is said too much tormented by the motion of a heavy hand; but, on the contrary, the motion appears free, quick, and light, it is said that the work is of a good pencil. But that free pencil is of but little signification, unless it be guided by the head, and shew that the painter is master of his art. In a word, a fine pencil is to painting what music is to a fine voice; since both are esteemed in proportion of the grand effect, and harmony which accompany them.

The next thing our pupil painter is to provide himself with, is colours; for which he has instructions sufficient to guide his choice in a proper selection.—His next care is pencils, brushes, &c. to apply them.

There are pencils of various kinds, and more of various matters; the most useful are made of badgers and squirrels hair, those of swans down, and those of boars bristles; which last are bound on to a stick, bigger or less, according to the uses they are destined for; and when large are called brushes. The others are inclosed in the barrel of a quill.

Besides pencils, we must have a pallet, which is a little oval table, or piece of wood or ivory, very thin and smooth; on and round which the painters place the several colours they have occasion for, ready for the pencil. The middle serves to mix the colours on, and to make the tints required in the

work. It has no handle, but in lieu thereof, a hole at one end, to put the thumb through to hold it.

With regard to the materials in painting, the matter whereon they are applied, and the manner of applying them, is of various kinds, hence came painting in fresco; painting in oil; painting in water colours, or limning; painting in miniature; painting in enamel; and painting on glass.

Fresco is a kind of painting performed on a fresh plaister, or on a wall laid with mortar, not yet dry, and with water colours.

The colours used, are white made of lime flaked long ago, and white marble dust; oker, both red and yellow, violet red, verditer, lapis lazuli, smalt, black earth, &c. all which are only ground and worked up with water; and most of them grow brighter and brighter, as the fresco dries.

This sort of painting is chiefly performed on walls and vaults, newly plaistered with lime and sand: but the plaister is only to be laid in proportion as the painting goes on; no more being to be done at once than the painter can dispatch in a day, while it is dry.

Before he begins to paint, a cartoon or design is usually made on paper, to be chalked and transferred to the wall, about half an hour after the plaister is applied.

Painting in oil is performed on walls, on wood, canvas, stones, and all sorts of metals.

To paint on a wall.—When well dry, you must give it two or three washes with boiling oil, till the plaister remains quite greasy and will imbibe no more. Over this are applied desiccative or drying colours, viz. white chalk, red oker, or other chalks
beaten

beaten pretty stiff. This layer being well dried, you will sketch and design your subject; and at last paint it over; mixing a little varnish with your colours, to save the varnishing afterwards.

Others, to fortify their wall better against moisture, cover it with a plaister of lime, marble dust, or a cement made of beaten tiles soaked with linseed oil; and at last prepare a composition of Greek pitch, mastich, and thick varnish, boiled together, which they apply hot over the former plaister; when dry, the colours are applied as before.

To paint on wood.—They usually give their ground a layer of white, tempered with size; or they apply the oil abovementioned. The rest as in painting on walls.

To paint on cloth or canvas.—The canvas being stretched on a frame, you must give it a layer of size, or paste water. When dry you shall go over with a pumice stone, to smooth off the knots.

When the cloth is dry, a lay of oker must be laid on, sometimes mixing with it a little white lead to make it dry the sooner. When dry you will go again over it with the pumice stone, to make it smooth.

After this, a second layer, composed of white lead, and a little charcoal black is sometimes added, to render the ground of an ash colour; observing in each manner to lay on as little colour as possible.

As little oil is to be used as possible, if it be desired to have the colours keep fresh; for this reason some mix them with oil of aspic, which evaporates immediately, yet serves to make them manageable with the pencil.

As to oils, the best are those of walnuts, linseed, aspic, and turpentine. The desiccative or drying oils,

oils, are a nut oil boiled with litharge and sandarach; others with spirit of wine, mastich, and gumlacca.

The next operation is to draw the design on the canvas; and afterwards to prime the work, which is done by laying a lay of white all over it, except on the lines of the draught, which must be kept visible. Then if the picture be a history piece, or a portrait, the painter begins by the face or faces; which, together with all the other naked parts to be pronounced in the picture, are called carnations. The carnations are made with white and carmine; and brown, blue and yellow for the shadows; according to the complexion the painter designs to give to the figure or figures he is to represent.

The application of colours in painting, is considered either with regard to the kinds of painting, in works of various colours, or in those of one single colour.

First, in the larger pieces, the colours are rather laid on full, so as they may be impressed or incorporated together, which make them hold the more firmly.

Or else the more agreeable ones, which dry too hard and too hastily, are mixed with a little colour, and the clearest of the oil. But in both cases, the colours are to be laid on strong at first; it being easy to weaken those which are to be thrust back, and to heighten the others; the touches to be bold, by the conduct of a free and steady pencil; that the work may appear the most finished at a proper distance, and the figures animated with life and spirit.

For glazed colours, care must be taken, that the under colour be painted strong, and that it be a body colour, and laid smooth.

In

In finished works, which are to be viewed near at hand, the process is either by applying each colour in its place; preserving their purity, without fretting or tormenting them, but sweetly softening off the extremities; or by filling up all the great parts with one single colour; and laying the other colours which are to form the little things upon it, which is the more expeditious way, but more apt to decay.

For the second; the kinds of pictures in one colour are two, viz. *camieux*, where the degradations of colours of objects afar off, are usually managed by lights, or with crayons, and *bass relievo*, which is an imitation of sculpture, of whatsoever matter and colour; in both these the colours are wrought dry.

For the œconomy, and dispensing of colours in paintings, regard is either to be had, first, to the qualities of the colours, to appropriate them according to their value and agreement; or, secondly, to their effect, in the union and œconomy of the work.

For the qualities, 'it must be observed, that white represents light, and gives the briskness and heightening; black, on the contrary, like darkness, obscures and effaces the objects: again, black sets off the light parts, and by that they serve each other to loosen the objects. A proper choice to be made of colours; and the too much charged manner to be avoided; both in carnations, where red colours are not to be affected, or rather resembling the flesh when freed from the skin, how delicate soever, being always of a bloom colour. In the drapery, where the painter has his whole stock of colours to choose out of to procure a good effect; and in the
landskape,

landskape, to dispose those colours near one another, which mutually assist and raise each others force and briskness; as red and green, yellow and blue.

To manage them so, as that they may be accommodated to the effects of the great parts of light and colours; that the strong colours lead to the soft ones, and make them more looked at, bringing them forwards, or keeping them back, according to the situation and the degree of force required.

For the effects of colours, they either regard the union, or the œconomy; with respect to the first, care must be taken that they be laid so as to be sweetly united under the briskness of some principal one; that they participate of the prevailing light of this piece, and that they partake of each other by the communication of light, and the help of reflection.

For the œconomy in managing their degrees, regard is to be had to the contrast, or the opposition intervening in the union of the colours, that, by a sweet interruption, the briskness, which otherwise fades and palls, may be raised; to the harmony, which makes the variety of colours agree, supplying and sustaining the weakness of some by the strength of others, neglecting some places on purpose to serve as a basis or repose to the sight, and to inhanse those which are to prevail through the piece: to the degradation, where the better to proportion the colours that fall behind, some of the same kind are to be preserved in their purity, as a standard, for those carried afar off to be compared by, in order to justify the diminution: regard being always had to the quality of the air, which, when loaded with vapours, weakens the colours more
than

than when clear: to the situation of the colours, where care must be taken, that the purest and the strongest be placed before, or in the front of the piece; and that by their force, the compound ones, which are to appear at a distance, be kept back, particularly the glazed colours to be used in the first rank. Lastly, to the expression of the subject, and the nature of the matters, or stuffs, whether shining or dull, opake or transparent, polished or rough.

The different colours, which you are to employ in your picture are to be mixed as follows: For a violet colour, take indigo, white lead and lake; mix them all well together; and the more or less of each quantity will make it deeper or lighter. A lead colour is made of white and indigo, well mixed together. A scarlet of lake, red lead, and a little vermillion; though, in fine paintings, I would prefer carmine, with a very small quantity of ultramarine, and a still smaller one of fine cerufs. A light green of pink and smalt. A middle and light green, of verdigrise and pink; a deep and sad green, indigo and pink. A purple colour of Spanish brown, indigo and white well mixed. A murrey colour of white and lake. A flame colour of red lead and masticot, heightened with white. But these general rules are not to captivate the imagination of a painter, no more than the following ones; for a good painter who has a good natural genius for his art, and takes pleasure in the practice thereof, makes often new discoveries to render his draperies more beautiful; as for carnations they are always made of the same mixture of colours; the whole secret consisting in the judicious application thereof.

N

After

After a painter has transferred his draught on his canvas, and has primed it, he begins his piece, first, by drawing the eyes or nose (having while he works, his right hand supported with a moll stick or flay, made of heavy wood, not subject to bend, about a yard long, having at the end, which leans against the picture, a ball of ravelled cotton, with a leather over it, the other end held with the left hand) making the white thereof with white lead, with a little charcoal black. This finished, he leaves from the eye (in a face full front) the distance of an eye, then draws the proportion of the nose; afterwards makes the mouth, ears, &c. This done, he lays his carnation or flesh colour over the face, casting in, here and there some shadows, which he works in by degrees with the flesh colour; which flesh colour is commonly compounded of white lead, lake and vermillion or carmine, this last being best. There is no fixed rule for heightening or deepening this colour; for it is left to the discretion and judgment of the painter; who must consult in this his own imagination, with regard to the age, country, &c. of the person, whose face he endeavours to represent. Then he shadows the face over as he sees cause, and finishes the nose, compassing the tip of it, with some dark, or light reddish shadows; which shadows, for the face, are commonly compounded of ivory black, white lead, vermillion, lake, sea-coal black, &c. The cheeks and lips are shadowed with vermillion or carmine, and lake mixed together; and the mouth stroke is made with lake only. As to the circles of the eyes; for grey eyes they are made of charcoal black and white lead, heightened and deepened at pleasure: the black circle of the

the eye is made of umber, seacoal black and a little white mixed together: the round ball in the eye of lamp black and verdigrise, since the lamp black will hardly dry without it. The same colours used in painting and shadowing the face, are used in painting the hands, and shadowing them between the fingers. When a painter wants to make a flesh colour of a swarthy complexion, he mixes white lead, lake, and yellow oker together, and shadows it with a mixture of umber and seacoal black.

For black hairs he uses lamp black only, and when he will have them brighter, mixes it with a little umber, white and red lead; putting in more umber if he wants them browner, and more white lead, if whiter; but if quite dark, he adds a little seacoal black. Yellow hairs are made of a mixture of masticot, umber, yellow oker, and a little red lead; increasing the quantity of umber and red lead, if they be wanted redder. For white hairs he takes an equal quantity of ivory black, and of umber, viz. half of each, and tempers them well upon his pallet with white lead, taking more or less of those three colours, according as the hairs are to be heightened or deepened.

The teeth are made of white lead, and shadowed with charcoal black.

As to the different stuffs the figures are to be clothed with, it must be left entirely to the imagination and judgment of the painter.

The several colours used in painting, are also called tints, and semi-tints; considering the colours as more or less high, or bright, or deep, or thin, or weakened and diminished, &c. to give the proper relieve, or softness, for distance, &c.

to the several objects; and the lessening and rendering dim and confused the appearance of different objects in a landscape, so as they shall appear there as they would do to an eye placed at that distance from them, is called, in painting, degradation.

As to painting in water colours, called limning, in contra-distinction of painting properly so called, which is done in oil colours, the usual colours are proper enough excepting the white, made of lime, which is only used in fresco. But the azure, or ultramarine, must always be mixed up with size, or with gum; in regard to yolks of eggs, they give blue colours a greenish tincture; but there are always applied two lays of hot size, before the colours mixed even with size, are laid on: the composition made with eggs and the juice of the fig tree, being only used for touching up, and finishing, and to prevent the necessity of having the fire always at hand to keep the size hot; yet it is certain, that the size colours hold the best, and are accordingly always used in cartoons, &c.—This size is made of shreds of thin leather, or of parchment.

To limn on linen, the best is that which is old, half worn and close.—This is stamped with white lead, or a fine plaister beaten up with size; which, once dry, we must go over it with a layer of the same size.

The colours are all ground in water, each by itself; and in proportion as they are required in working, are diluted with their size water.—If the yolks of eggs are desired, they must be diluted with water made of equal quantity of common water and vinegar, with the yolk, white, and shell of an egg, and the end of the little branches of a fig tree

tree cut small, all well beaten together in an earthen pan.

Painting in miniature is a delicate kind of painting, consisting of little points or dots instead of lines, usually done on vellum, with very thin simple water colours,

The colours for miniature may be mixed up with water of gum-arabic, or gum-tragacanth.

The operation is usually made on vellum, on which the design is drawn, with carmine, or some other colour, which may render the lines discernable. The draught is filled afterwards, with a very thin and smooth lay of white, yet some choose to paint on the naked vellum without any lay; and in my opinion it contributes much towards incorporating well the colours, that the dots may not appear so visible, and so coarse, as they do without it. When the lay is dry, the painter searches with his pencil all the lines of the draught, lest some of them should be either much weakened, or entirely obliterated by the lay of white; then he begins, as in all other paintings, by the face, dipping first the point of his pencil in water, and rubbing it afterwards on the colour he designs to employ; when thus rubbed, he makes the point thereof with the tip of his lips, and then applies it on the vellum, repeating the same process every time he wants colours, and having different pencils for the different colours. He has also before him a shell with gum water, in case he wants to dip his pencil in it, as it often happens.

Painting in mosaic is an assemblage of little pieces of glass, marble, shells, precious stones, woods, or the like of various colours cut square, and cemented on a ground of stucco, imitating the natural colours and degradations of painting.

DIRECTIONS

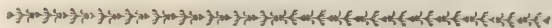
DIRECTIONS *for colouring of FLOWERS* *and painting upon SILK.*

FLOWER-PAINTING with water colours is an art in which nature affords an infinite variety of unrivalled examples, yet may be easily imitated; being possessed of the colours herein described,* and well attending to the rules laid down. First of colours: they are of two sorts, transparent and body colours; of all which the preferable hue will determine your choice in purchasing.

All the teints necessary for flower-painting are contained in, or may be combined from the above list; for instance, sap green will receive various hues by adding Prussian blue or gumboage, and so of the rest; and those not of themselves gummy, which sap green, Indian ink, gumboage, and logwood purple

* Names.	Transparent.	Ditto, body colour.
White.	Poland starch.	Flake white, or well-washed whiting.
Black.	Indian ink.	Ivory black, which must be mixed first with brandy.
Red.	Carmine.	Lake, vermillion and red lead.
Blue.	Ultramarine, indigo, and Prussian blue.	Verditer and blue bice.
Green.	Sapgreen, or gumboage and Prussian blue.	Verditer and Dutch pink.
Yellow.	Gumboage.	Naples yellow, Dutch or English pink.
Orange.	Carmine and gumboage.	Vermillion and Dutch pink.
Brown.	Bistre or gallstone.	Umbre.
Purple.	Carmine and Prussian blue, or tincture of logwood.	Lake and verditer, or rose pink and bice.

ple are, must be mixed with a solution of clear gum-arabic in water, the true strength of which you will know by the colour when dry; if it rubs off with the finger, it is too weak; and if it cracks or scales off, it is too strong. The colours when first mixed with gum water will not work so free, as if dried and ground afresh with common water. Be careful to spread each colour smooth, in order to which, let your pencil be as large as the subject will admit: in transparent colours lay on the pale first, to which give depth by four or five (at most) gradations; softening the harsh distinctions of tints by taking off the edge with a clean pencil dipt in water. With body colours your work will look more picturesque by laying on first the middle tint; but with these, and the transparent too, let each colour dry before you apply another. If your colour or paper seem greasy, add a drop or two of gall, and it will readily adhere. Clean your pencils always, as they will spoil by being left in the colour or water.



INSTRUCTIONS *for* COLOURING.

C O L U M B I N E.

THIS flower admits of a great variety and display in the drawing; some are blue, others purple, others again are striped, crimson on white or straw coloured grounds. The green is the common green, begun with sap green, and finished with a mixture of gumboage and indigo; making some parts with gumboage, a little carmine and green, as fading, which

which makes a pleasing appearance in picture though not in nature.

B A L S A M.

The balsam is varied with white and red stripes, sometimes all red, to be painted as the other flowers to variegated. The leaves are a pleasant green, and the stalk of a fine red, and very smooth and transparent.

S W E E T S C E N T E D P E A.

This beautiful blossom is thus variegated; the two outer petals are a purplish crimson, the two inner are a deep blue, a little inclining to the purple, the most inner part is white, just tinged with purple. The purplish crimson to be begun with deep carmine, and finished with purple, adding indigo for the deepest shade. The blue which inclines to purple, begin with Prussian blue, and as the shades grow stronger, adding carmine and indigo. The leaves, stalks, and tendrils are a blueish green.

J A S M I N E.

Our common jasmines are a snowy white, which, when properly composed, by throwing the flower artfully on the green leaves, have a very light and pleasing appearance. But the jasmine we have here chosen from nature, is the large Catalonian jasmine, being the most conspicuous in shape and varied in colour; the outside being a pleasant crimson, inclining to a purple, and the inside a pure white. The leaves of both are deepish green. There is also a yellow jasmine, with leaves broader and of a shining green.

HYACINTH

H Y A C I N T H.

Hyacinths are blue, or white; others are white, with a faint tinge of crimson. The blue ones are begun with bice, shadowing with Prussian blue, and finishing with indigo. The light parts may be worked at discretion, either leaving the paper, by neatly shading with bice, or by laying it all over and heightening with white. The white hyacinths may be coloured in the same manner as the white lily. For those with a blush of crimson, a faint tinge of carmine must be tenderly washed over, and finishing as directed for the white ones. If ultramarine is used instead of bice, it will make the work appear more delicate. The stalk and leaves are a blueish green, done with the same mixture as the lily.

A U R I C U L A.

This beautiful flower is by the gardeners' art so varied, that a particular description of its varieties would be endless. A much esteemed sort is to be coloured thus: begin with a pale lay of gumboage, shadowing it with bistre, leaving a broad space round the centre white; which part is to be shadowed with Indian ink, mixed with sap green: then that part which is begun with gumboage is to be variegated with a purplish red, made by a mixture of carmine and Prussian blue. The hollow in the centre must be a strong yellow, shadowed with gumboage and carmine, mixed together. This done, it is to be neatly dotted with white, mostly on the centre; mixing Indian ink proportionably with the white, as the flower becomes dark. The stalk and leaves are a greyish green, to be painted with a mixture

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ture of sap green, white and indigo, adding more indigo for the shades.

A N E M O N E.

Of these flowers, especially the double ones, there is such a variety, and the colours on them so diversified, that we can only mention the richest sorts, and leave the practitioner to the study of nature, that inexhaustible fund of improvement. The large petals are white, striped or clouded with carmine. The small petals are done with pale straw colour, shaded with neat lines of carmine, or green, made with indigo and gumboage according to fancy. The stalk is brown, by a mixture of carmine and sap green, shaded with indigo and carmine. The leaves sap green, and finished with gumboage and indigo.

D O U B L E J O N Q U I L.

This flower is a fine yellow; to be done with gumboage and shadowed with carmine and gumboage mixed together, and the darkest parts with bistre and a little carmine. The stalks and leaves are a blueish green, made with Prussian blue and sap green; adding indigo in the darkest parts. The upper part of the stalk is brown.

T U L I P.

This flower is not at all inferior to the carnation, as to variety, though somewhat different in disposition of colour, the tulip being generally ornamented with stripes of various colours, crimsons and purples, upon either a white, yellow, or straw colour ground, are the most common. For the mixtures and shading which colours, any student, by
recollecting

recollecting the preceding directions, will be enabled properly to colour this flower. The leaves and stalk may be done in the same manner of those of the carnation.

R O S E.

The rose is, and very justly, the favourite of the painters; seldom left out in any composition, where it can be admitted. Esteemed for its natural tenderness of colour, and boldness of shape, it furnishes matter for the most masterly pencil. Our common method of colouring this flower, is to begin with a lay of thin carmine; and to shadow it, by using the carmine in degrees thicker, and consequently darker. This manner, by its gay appearance, at first, courts the eye, but is evidently erroneous; for, notwithstanding the finest colours we can use are but dirt, when compared with the natural gaiety of the tints on flowers, yet the colouring the rose with carmine only, gives it a disagreeable and unnatural glare: to prevent which it is here recommended, after the first or lightest carmine is laid on, soften it with a faint wash of Prussian blue, then proceed with pure carmine; and to give power to the darkest parts of the flower and roundness to its appearance, add a little indigo. If one is represented so much blown as to shew the buttons in the middle, they are first to be laid with gumboage, and shadowed with gumboage and carmine mixed together. The stalks are brownish, done with sap green, and a little carmine; adding indigo for the shades, on the dark side. The upper sides of the leaves are done with sap green, shadowed with gumboage and indigo mixed together, to make a

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dark green. The backs, or under sides, are a dullish green made of white, indigo and a little sap green. It is not pleasing in nature, but to make some of the leaves a yellowish brown, as if withering, gives a natural and pleasant air in painting; which is to be done with a mixture of gumboage, sap green, and carmine.

The STRIPED or MUNDI-ROSE.

This species of the rose is thus variegated; the ground colour is so pale a crimson as to be almost white, which is to be begun with a lay of carmine, so thin as only just to tinge the paper. The striping with carmine, deep according to fancy, even as strong as in some tulips; finishing the striped part with the shades usual for crimsons. The pale part must be finished according to the rules for white flowers; only adding a little carmine, so as to make it a faint blush. For the leaves and stalk, the directions given for the foregoing rose are sufficient.

R A N U N C U L A.

Ranunculas are variously coloured; some are white, edged or coloured with crimson; others straw colour, or yellow, striped with scarlet, which may be executed according to the directions given for other flowers of the same colour, a repetition of the mixture of the colours being needless. The leaves are done with sap green, shadowing with indigo and gumboage; taking the liberty of making some leaves yellowish or brown, which makes a pleasing variety in the work. The stalk is to be made brown, by a mixture of carmine and sap green.

CARNATION.

C A R N A T I O N.

There is such an infinite variety of carnations, that a particular description of them would be endless, being composed of the following colours; white, crimson, scarlet and purple; and those colours so diversified that the student may take the liberty of his fancy, without danger of deviating from what may happen in nature. The cup, leaves and stalk, are a pale blueish green, to be done with a mixture of Prussian blue, sap green, and white, adding indigo for the darkest parts.

M A R T A G O N.

Martagons are some yellow, others a most rich scarlet. The yellow ones are done with a pale gumboage, shading with bistre, carmine and yellow mixed together, so as to make a pleasant brown. At the base of each petal are neat spots of strong indigo. The stalks and leaves are a pleasant green; to be done with sap green, and a very little Prussian blue. The bottom of each leaf swells into a roundish knob, which is considerably paler than the other parts. The scarlet ones are to be smoothly laid with red lead, shading with carmine; adding indigo for the deepest shades. The style, filaments and buttons, are orange colour; laid first with gumboage, and shadowed with carmine.

P O P P Y.

The instructions given for the carnation, are all that are required for this flower; only observing that it is diversified by different colours on the edges of the petals, not striped or clouded as that flower.

SUN-FLOWER.

S U N - F L O W E R.

The petals of this noble, though common flower, are a fine yellow, painted in the same manner as the yellow part of the jonquil. The centre is a strong reddish brown, made with yellow, carmine and indigo; using more carmine and indigo for the deepest shades. The leaves and stalk are a pleasant green, done with sap green, shadowed with the same colour, and deepened with indigo and gumboage.

L I L Y.

Lilies are either white or orange colour. The white ones are done by leaving the paper for the lightest parts; and shadowing with a mixture of Indian ink, indigo, and a very little sap green; keeping, (as has been before recommended for other flowers) a proper gradation of the shades. The buttons are orange colour, and the style a pale green. The leaves and stalk are a blueish green, with a mixture of sap green and Prussian blue, finishing with Indigo. The orange coloured ones are done in the same manner as the direction given with the jonquil, spotting the inside of each petal with indigo towards its base. The buds, while young, are green, turning to the orange as they ripen, which makes a pleasing variety in the colouring.

D O U B L E S T O C K.

Double stocks are a purplish crimson, or variegated with white and crimson. The cluster of small petals in the middle is green, which diffuses itself faintly on the larger ones, and affords a pleasing diversity. The stalk and leaves are a whitish green.

AFRICAN.

A F R I C A N.

Africans are either yellow or orange colour. The yellow ones are to be done according to the directions for the yellow part of the jonquil, either pale or deeper at discretion; and the orange colour ones, as the cup of the jonquil. The stalk and leaves are a pleasant green.

H O L Y H O C K.

Holyhocks vary, from the palest rose colours to the deepest crimson. Some are white, which, in a composition, afford an agreeable contrast to the other flowers, by their beautiful shape; but if represented singly, it is easily imagined, any of the other colours are the most interesting; for which the method laid down for painting the rose, will answer; using the same colours deeper, according to fancy, preserving a proportionable shade of colour, that the deep shades may not appear too suddenly dark to drown the effect of the pale colours. The stalk and leaves are a pale green, to be done with sap green mixed with white, for the pale colours; the same colour, only less white, for the next shade, and adding a little indigo for the darkest shades.

P A S S I O N F L O W E R.

This flower is, in nature, so beautifully singular in its structure, that without the advantage of colour (in which it is also delightful) it would engage the attention of every curious observer of nature. The petals are a greenish white, to be painted with a mixture of Indian ink and sap green, leaving the paper in the light parts. The threads are so exactly
set

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set and coloured, as to form three circles of different colours, viz. the outer one blue; shadowed with Prussian blue. The next is white; to be done by continuing the stroke with flake white, making the space between each thread dark, with the Indian ink and indigo. The inner circle is a reddish purple; done with a mixture of carmine and a little Prussian blue. The centre of the flower is a pale yellow. The five buttons are yellow in the inside; which is the part mostly seen, by their curling back as soon as the flower blows. The other parts, which project from the centre, are a pale green, excepting the three projections for the top, which are purple. The bud is a pale green, with a tinge of red at its end. The leaves are a dark green; to be done with indigo, gumboage, and a little Indian ink mixed together. The stalk and tendrils are made brown, with sap green and carmine. The religious have named this flower, from a supposition of its parts describing the passion of our Lord.

H O N E Y - S U C K L E.

The outside of this flower is begun with a lay of carmine mixed with a little lake, adding indigo for the dark shades. Some flowers, in the same cluster, are more purple than others, which may be done at discretion, to make a variety of colour, by adding Prussian blue to the carmine. The insides of the petals, which are shewn by their splitting and curling back at the ends, are some white; others straw colour. The white to be shadowed with Indian ink, mixed with a very little sap green; the straw colour with a very pale lay of gumboage, shadowed with bistre. The style and buttons, seen at the
ends

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ends of the flower, are a faint green. The stalks are a purplish brown, with carmine and a little sap green; the leaves sap green, shadowed with gumboage and indigo.

H E A R T', E A S E.

The two upper petals of this flower are a rich purple; the other three yellow, or straw colour, edged and otherwise stained with purple, or olive colour, with very fine lines of a deep purple; beginning at the base, and spreading delicately over each petal. The stalk and leaves are a pleasant green.

C O N V O L V U L U S.

Blue is the principal colour of the convolvulus; but the base is stained with yellow, which gradually becomes white, and spreads itself in rays like a star in the centre. The leaves and stalk are a whitish green.

P I N K.

The single pink does not admit of so great a variety as the carnation, but it is nevertheless so variegated as to make it an agreeable flower for fattins, filks, &c. The most common are either white or crimson, others are striped white and red, others are white spotted with red, others edged with red; all which may be worked according to the rules for the other flowers so diversified with the same colours. The leaves and stalk are a blueish green, only at the joints there is, for the most part, a yellowish tinge, which is also at the bottom of the cup and scales.

P

PAINTING

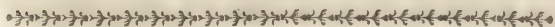
PAINTING *on* SILKS, SATTINS, &c.

HAVING with the utmost circumspection laid down the rules for painting on paper, we now proceed for the amusement and instruction of those ingenious ladies who delight in the abovementioned branch, with the same care to give the following necessary instructions.

When the outline is made according to the artist's fancy, a wash of isinglass should with care be laid on to take away the glare and sleekness of the sattin, otherwise the colours will not work freely; the isinglass to be melted in very clear water, over the fire, so as not to be very glutinous, otherwise it will discolour the sattin, and consequently spoil the colours.

In the foregoing rules we have recommended, for the most part, the leaving the paper for the light parts of a flower, and working with colours mostly transparent; but here the lights are to be made by a small tincture of the colour of the intended flower, mixt with flake white, so much as just to make a degree from the colour of the sattin, if white, or if any other colour, to be mixed proportionably to the colour of the flower; for instance, if a blue flower, the bice or verditer, a very small quantity of it with the white, using less of it proportionally as the shades grow darker, and, in the most dark, indigo alone may be used, it being by that time opaque enough; but great care must be used not to lay the colours on too thick, otherwise they will crack: a little white sugar-candy will be found very necessary, when mixt with the gum water, as a preventive

ventive to that inconveniency. If a flower happens to be of so deep a colour as not to admit of any pure white in the lightest of the parts, a sort of priming of white should be laid on, after which, when dry, begin with the ground colour of the flower, proceeding gradually with the shades as in the above directions, which, with lively flowers peculiarly chosen from nature for the purpose, we hope will be sufficient to initiate our ingenious and fair students in this most delightful amusement.



PAINTING *with* CRAYONS.

WHETHER the painter works with oil colours, water colours, or crayons, the grand object of his pursuit is still the same : a just imitation of nature. But each species has its peculiar rules and methods. Painting with crayons requires, in many respects, a treatment different from painting in oil colours ; because all colours used dry are, in their nature, of a much warmer complexion than when wet with oils, or any other binding fluid. Let this be proved by matter of fact :—Mr. Cotes painted a portrait of Sir William Chambers, which is in Lord Bessborough's collection. An ingenious foreigner had discovered a method of fixing crayon pictures, so that they would not rub or receive an injury if any accident happened to the glass. The society for the encouragement of arts had before offered a premium to any one who should discover so valuable a secret, for which premium he made application.

Mr. Cotes being eminent in his profession, was desired to lend a picture for the trial, and give his judgment, which was made on this portrait of Sir William Chambers. The crayons he indeed so perfectly fixed as to resist any rub or brush without the least injury, which before would have entirely defaced or spoiled it: but the picture, which before had a particularly warm, brilliant, and agreeable effect, in comparison became cold and purple; and though in one sense the attempt succeeded to the designed intention of fixing the colours, yet the binding quality of whatever fluid was made use of in the process, changed the complexion of the colours, rendering the cold tints too predominant. For this reason, in order to produce a rich picture, a much greater portion of what painters term cooling tints must be applied in crayon painting, than would be judicious to use in oils. Without any danger of a mistake, it is to be supposed, the not being acquainted with this observation is one great cause why so many oil painters have no better success when they attempt crayon painting. On the contrary, crayon painters, being so much used to those tints which are of a cold nature when used wet, are apt to introduce them too much when they paint with oils, which is seldom productive of a good effect.

Another observation I would make, which requires particular notice from the student who has been conversant with oil painting, prior to his attempts with crayons; oil painters begin their pictures much lighter and fainter than they intend to finish them, which presents the future colouring clear and brilliant, the light underneath greatly assisting the transparent glazing and scumbling colours, which, if they

were

were laid over any part already too dark, would but increase its heavy effect. On the contrary, crayons being made of dry colours, are difficult to procure sufficiently dark, the crayon painter therefore will find an absolute necessity to begin his picture as dark and rich as possible, except in the strongest lights; for if once the grey and light tints become predominant, it will be next to impossible for him (in the deep shadows especially) to restore depth and brilliancy, having no opportunity of glazing or scumbling to give the effect, as the grey tints being mixtures with whiting underneath, will continually work up and render the attempt abortive.

I shall now endeavour to give the student some directions towards the attainment of excellence in this art.

The student must provide himself with some strong blue paper, the thicker the better, if the grain is not too coarse and knotty, though it is almost impossible to get any intirely free from knots. The knots should be levelled with a penknife or razor, otherwise they will prove exceedingly troublesome. After this is done, the paper must be pasted very smooth on a linen cloth,* previously strained on a deal frame, the size according to the artist's pleasure: on this the picture is to be executed; but it is most eligible not to paste the paper on till the whole subject is first dead-coloured. The method of doing this is very easy, by laying the paper with the
dead-

* That side of the paper should be pasted which has the strokes from the wires most evident, that the painting may be on the smoothest side, otherwise the lines, which these wires have left in the paper will prove troublesome and look unpleasant.

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dead-colour on its face, upon a smooth board or table, when, by means of a brush, the backside of the paper must be covered with paste; the frame, with the strained cloth, must then be laid on the pasted side of the paper; after which turn the painted side uppermost, and lay a piece of clean paper upon it, to prevent smearing; this being done, it may be stroked gently over with the hand, by which means all the air between the cloth and the paper will be forced out.

When the paste is perfectly dry, the student may proceed with the painting. The advantages arising from pasting the paper * in the frame, according to this method, after the picture is begun, are very great, as the crayons will adhere much better than any other way, which will enable the student to finish the picture with a firmer body of colour, and greater lustre. The late Mr. Cotes discovered this method by accident, and esteemed it a valuable acquisition; and, I remember, on a particular occasion, he removed a fine crayon picture of Rozalba's, and placed it on another strained cloth, without the least injury, by soaking the canvas with a wet sponge, till

* Some crayon pictures are painted on vellum; but the animal salts in the skin very often cause them to mildew. It must be confessed the vellum gives the picture a soft effect; but its use cannot be recommended in our unfavourable climate. Others make use of small grounds; Le Tóur, lately a painter of note in Paris, often used them with great success. The method to prepare them is to brush over the paper with gum water, which directly flew with small moderately fine, the superfluous part of which should be swept off, with a painter's brush, when the gum water is perfectly dry. On this the picture is to be painted; but we have paper now in England to be procured of so excellent a texture, as to render this preparation perhaps unnecessary.

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till the paste between the cloth and paper was sufficiently wet to admit of separation.

When painters want to make a very correct copy of a picture they generally make use of a tiffany, or black gauze, strained tight on a frame, which they lay flat on the subject to be imitated, and with a piece of sketching chalk, trace all the outlines on the tiffany. They then lay the canvas to be painted on, flat upon the floor, placing the tiffany with the chalked lines upon it, and with an handkerchief brush the whole over: this presents the exact outlines of the picture on the canvas. The crayon painter may also make use of this method, when the subject of his imitation is in oils, but in copying a crayon picture, he must have recourse to the following method, on account of the glass:

The picture being placed upon the esel, let the outlines be drawn on the glass with a small camel's hair pencil dipped in lake, ground thin with oils, which must be done with great exactness; after this is accomplished, take a sheet of paper of the same size, and place it on the glass, stroking over all the lines with the hand, by which means the colours will adhere to the paper, which must be pierced with pin holes pretty close to each other. The paper intended to be used for the painting must next be laid upon a table and the pierced paper placed upon it; then with some fine pounded charcoal, tied up in a piece of lawn, rub over the perforated strokes, which will give an exact outline. Great care must be taken not to brush this off till the whole is drawn over with sketching chalk, which is a composition made of whiting and tobacco-pipe clay, rolled like crayons, and pointed at each end.

When

When the student paints immediately from the life, it will be most prudent to make a correct drawing of the outlines on another paper, the size of the picture he is going to paint, which he may trace by the preceding method, because erroneous strokes of the sketching chalk (which are not to be avoided without great expertness) will prevent the crayons from adhering to the paper, owing to a certain greasy quality in the composition.

The student will find the fitting posture, with the box of crayons on his lap, the most convenient method for him to paint. The part of the picture he is immediately painting should be rather below his face, for, if it is placed too high, the arm will be fatigued. Let the windows of the room where he paints be darkened at least to the height of six feet from the ground, and the subject to be painted should be situated in such a manner, that the light may fall with every advantage on the face; avoiding too much shadow, which seldom has a good effect in portrait painting, especially if the face he paints has any degree of delicacy. Before he begins to paint, let him be attentive to his subject, and appropriate the action or attitude proper to the age of the subject: if a child, let it be childish; if a young lady, express more vivacity than in the majestic beauty of a middle aged woman, who also should not be expressed with the same gravity as a person far advanced in years. Let the embellishments of the picture, and introduction of birds, animals, &c. be regulated by the rules of propriety and consistency.

The features of the face being carefully drawn with chalk, let the student take a crayon of pure carmine,

carmine, and carefully draw the nostril and edge of the nose, next the shadow; then, with the faintest carmine tint, lay in the strongest light upon the nose and forehead, which must be executed broad. He is then to proceed gradually with the second tint, and the succeeding ones, till he arrives at the shadows, which must be covered brilliant, enriched with much lake, carmine, a little broken, with brilliant green. This method will, at first, offensively strike the eye, from its crude appearance; but, in finishing, it will be a good foundation to produce a pleasing effect, colours being much more easily sullied when too bright, than when the first colouring is dull, to raise the picture into a brilliant state. The several pearly tints, discernable in fine complexions, must be imitated with blue verditer and white, which answers to the ultramarine tints used in oils. But if the parts of the face where these tints appear are in shadow, the crayons composed of black and white must be substituted in their place.

Though all the face, when first coloured, should be laid in as brilliant as possible, yet each part should be kept in its proper tone, by which means the rotundity of the face will be preserved.

Let the student be careful when he begins the eyes to draw them with a crayon inclined to the carmine tint, of whatever colour the iris are of; he must lay them in brilliant, and, at first, not loaded with colour, but executed lightly: no notice is to be taken of the pupil yet. The student must let the light of the eye incline very much to the blue cast, cautiously avoiding a staring, white appearance, (which, when once introduced, is seldom over-

come) preserving a broad shadow thrown on its upper part, by the eye-lash. A black and heavy teint is also to be avoided in the eye-brows; it is therefore, best to execute them like a broad, glowing shadow at first, on which, in the finishing, the hairs of the brow are to be painted, by which method of proceeding, the former teints will shew themselves through, and produce the most pleasing effect.

The student should begin the lips with pure carmine and lake, and in the shadow use some carmine and black; the strong vermillion teints should be laid on afterwards. He must beware of executing them with stiff, harsh lines, gently intermixing each with the neighbouring colours, making the shadow beneath broad, and enriched with brilliant crayons. He must form the corner of the mouth with carmine, brown oker, and greens, variously intermixed. If the hair is dark, he should preserve much of the lake and deep carmine teints therein; this may be easily overpowered by the warmer hair teints, which, as observed in painting the eye-brows, will produce a richer effect when the picture is finished; on the contrary, if this method is unknown or neglected, a poverty of colouring will be discernable.

After the student has covered over, or as artists term it, has dead-coloured the head, he is to sweeten the whole together by rubbing it over with his finger, beginning at the strongest light upon the forehead, passing his finger very lightly, and uniting it with the next teint, which he must continue till the whole is sweetened together, often wiping his finger on a towel to prevent the colours being sullied. He must be cautious not to smooth or
sweeten

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sweeten his picture too often, because it will give rise to a thin and scanty effect, and have more the appearance of a drawing than a solid painting, as nothing but a body of rich colours can constitute a rich effect. To avoid this, (as the student finds it necessary to sweeten with the finger) he must continually replenish the picture with more crayon.

When the head is brought to some degree of forwardness, let the back ground be laid in, which must be treated in a different manner, covering it as thin as possible, and rubbing it into the paper with a leather stump. Near the face the paper should be almost free from colour, for this will do great service to the head, and by its thinness, give both a soft and solid appearance. In the back ground also, crayons which have whiting in their composition should be used, but seldom or never without caution; but chiefly such as are the most brilliant and the least adulterated. The ground being painted thin next the hair, will give the student an opportunity of painting the edges of the hair over in a light and free manner, when he gives the finishing touches.

The student having proceeded thus far, the face, hair, and back ground being entirely covered, he must carefully view the whole at some distance, remarking in what respect it is out of keeping, that is, what parts are too light, and what too dark, being particularly attentive to the white or chalky appearances, which must be subdued with lake and carmine. The above method being properly put into execution will produce the appearance of a painting principally composed of three colours, viz. carmine, black, and white, which is the best pre-

paration a painter can make for producing a fine crayon picture.

The next step is to compleat the back ground and the hair, as the dust, in painting these, will fall on the face, and would much injure it, if that was compleated first. From thence proceed to the forehead, finishing downward till the whole picture is compleated.

Back grounds may be of various colours; but it requires great taste and judgment to suit them properly to different complexions: in general, a strong coloured head should have a weak and tender teinted ground, and, on the contrary, a delicate complexion should be opposed with strong and powerful teints; by which proper contrast between the figure and the back ground, the picture will receive great force, and strike the spectator much more than it could possibly do was this circumstance of contrast not attended to.

Young painters often treat the back grounds of pictures as a matter of very little or no consequence, when it is most certain great part of the beauty and brilliancy of the picture, especially the face, depends upon the teints being well suited, the darks kept in their proper places, and the whole being perfectly in subordination to the face. Thus a simple back ground requires attention, but the difficulty is still greater when a variety of objects are introduced, such as hills, trees, buildings, &c. in these cases one rule must be strictly attended to, that each grand object be disposed so as to contrast each other; this is not meant merely respecting their forms, but their colour, their light, shade, &c. For instance, we will suppose the figure receiving the strongest
light;

light; behind the figure, and very near at hand, are the stems of some large trees; these must have shade thrown over them, either from a driving cloud or some other interposing circumstance; behind these stems of trees, and at a distance, are seen trees on a rising ground; these should receive the light as a contrast to the former, &c. If an architectural back ground be chosen, the same rule must be applied; suppose a building at a moderate distance is placed behind the figure receiving the light, a column, or some other object in shadow should intervene, to preserve proper decorum in the piece, or what will have the same effect, a shadow must be thrown over the lower part of the building, which will give equal satisfaction or repose to the eye. It must be remembered, the light must be always placed against the dark, and the weak against the strong, in order to produce force and effect, and *vice versa*.

In painting over the forehead the last time, begin the highest light with the most faint vermilion tint, in the same place where the faint carmine was first laid, keeping it broad in the same manner. In the next shade succeeding the lightest, the student must work in some light blue tints, composed of verditer and white, intermixing with them some of the deeper vermilion tints, sweetening them together with great caution, * insensibly melting them into one another, increasing the proportion of each colour as his judgment shall direct. Some brilliant yellows may also be used, but sparingly; and towards

* This direction is for the finest complexions, but the student must vary his colouring according to his subject.

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wards the roots of the hair, strong verditer tints, intermixed with greens, will be of singular service. Cooling crayons, composed of black and white, should succeed these, and melt into the hair. Beneath the eyes, the pleasing pearly tints are to be preserved, composed of verditer and white, and under the nose, and on the temples, the same may be used; beneath the lips tints of this kind also are proper, mixing them with the light greens and some vermilion.

The introduction of greens and blues into the face, in painting, has often given surprize to those who are unacquainted with the art, but there is reason sufficient for their introduction (though it may appear strange at first) in order to break and correct the other colours.

The carmine predominating in the dead colour, is, as has been observed, the best preparation for the succeeding tints; the crudeness of this preparation must be corrected by variously intermixing greens, blues, and yellows; which of these are to be used is to be determined by the degree of carmine in the dead colour, and the complexion intended. The blue and yellow are of a nature diametrically opposite, and serve to correct the reds, and oppose one another; the greens being compounded of both these colours, is of peculiar use in many cases where the transition is not to be so violent.

The student, attentively considering nature, will discover a pleasing variety of colours on the surface, and discernible through a clear and transparent skin; this variety will be still increased by the effect of light and shade; he will perceive one part inclining to the vermilion red, another to the carmine

mine or lake, one to the blue, this to the green, and that to the yellow, &c. In order to produce these different effects he will apply those colours to which the tints are most inclined; yet in crayon painting it is often best to compound the mixed colours upon the picture, such as blue and yellow instead of green; blue and carmine instead of purple; red and yellow instead of orange; in other circumstances the compounds already mixed should be used: but in this case there can be no absolute rule given, it must be left to the experience and discretion of the painter, though the student may be greatly assisted in the commencement of his studies, by an able master to direct and point out the best method to treat circumstances of this nature, as they occur in practice, which may at first appear obscure and mysterious, but will soon, to a good capacity, become demonstrably clear upon certain and sure principles; the circumstances that require different treatment are so various and so many, as to render it impossible here to descend to every particular.

In finishing the cheeks, let the pure lake clear them from any dust contracted from the other crayons; then, with the lake, may be intermixed the bright vermillion; and last of all (if the subject should require it) a few touches of the orange coloured crayon, but with extreme caution; after this sweeten that part with the finger as little as possible, for fear of producing a heavy, disagreeable effect on the cheeks: as the beauty of a crayon picture consists in one colour shewing itself through, or rather between another; this the student cannot too often remark, it being the only method of imitating beautiful complexions.

The

The eye is the most difficult feature to execute in crayons, as every part must be expressed with the utmost nicety, to appear finished ; at the same time that the painter must preserve its breadth and solidity, while he is particularizing the parts. To accomplish this, it will be a good general rule for the student to use his crayon, in sweetening, as much, and his finger as little, as possible. When he wants a point to touch a small part with, he may break off a little of his crayon against the box, which will produce a corner fit to work with in the minutest parts. If the eye-lashes are dark, he must use some of the carmine and brown oker, and the crayon of carmine and black ; and with these he may also touch the iris of the eye (if brown or hazel) making a broad shadow, caused by the eye-lash. Red tints of vermillion, carmine, and lake, will execute the corners of the eye properly ; but if the eye-lids are too red, they will have a disagreeable fore appearance. The pupil of the eye must be made of pure lamp-black ; between this and the lower part of the iris, the light will catch very strong, but it must not be made too sudden, but be gently diffused round the pupil till it is lost in shade. When the eye-balls are sufficiently prepared, the shining speck must be made with a pure white crayon, which should be first broken to a point, and then laid on firm ; but as it is possible they may be defective in neatness, they should be corrected with a pin, taking off the redundant parts, by which means they may be formed as neat as can be required.

The difficulty, with respect to the nose, is to preserve the lines properly determined, and at the same

time

time so artfully blended into the cheek, as to express its projection, and yet no real line to be perceptible upon a close examination; in some circumstances it should be quite blended with the cheek, which appears behind it, and determined entirely with a slight touch of red chalk. The shadow caused by the nose is generally the darkest in the whole face, partaking of no reflection from its surrounding parts. Carmine and brown oker, carmine and black, and such brilliant crayons will compose it best.

The student having before prepared the lips with the strongest lake and carmine, &c. must, with these colours, make them compleatly correct, and, when finishing, introduce the strong vermillions, but with great caution, as they are extremely predominant. This, if properly touched, will give the lips an appearance equal, if not superior, to those executed in oils, notwithstanding the seeming superiority the latter has, by means of glazing,* of which the former is entirely destitute.

When the student paints the neck, he should avoid expressing the muscles too strong in the stem, nor should the bones appear too evident on the chest, as both have an unpleasing effect, denoting a violent agitation of the body, a circumstance seldom necessary to express in portrait painting. The most necessary part to be expressed, and which should ever be observed (even in the most delicate subjects) is a strong marking just above the place where the collar bones unite, and if the head is much thrown

* The method with which painters in oils express transparency in the lips is, by painting them first with light vermillion tints, and, when dry, touching them over with pure lake.

over the shoulders, some notice should be taken of the large muscle that rises from behind the ear, and is inserted into the pit between the collar bones. All inferior muscles should be, in general, quite avoided. The student will find this caution necessary, as most subjects, especially thin persons, have the muscles of the neck much more evident than would be judicious to imitate. As few necks are too long, it may be necessary to give some addition to the stem, a fault on the other side being quite unpardonable, nothing being more ungraceful than a short neck. In colouring the neck, let the student preserve the stem of a pearly hue, and the light not so strong as on the chest. If any part of the breast appears, its transparency must also be expressed by pearly tints, but the upper part of the chest should be coloured with beautiful vermillions, delicately blended with the other.



Of the MATERIALS.

THE perfection of the crayons consists, in a great measure, in their softness, for it is impossible to execute a brilliant picture with them if they are otherwise, on which account great care should be observed in the preparing them, to prevent their being hard.—In all compositions, flake white, and white lead should be wholly rejected, because the slightest touch with either of these will unavoidably turn black.

The usual objection to crayon paintings is, that they are subject to change, but whenever this happens
it

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it is entirely owing to an injudicious use of the above-mentioned whites, which will stand only in oils. To obviate the bad effects arising from the use of such crayons, let the student make use of common whiting prepared in the following manner:

Take a large vessel of water, put the whiting into it, and mix them well together; let this stand about half a minute, then pour off the top into another vessel, and throw the gritty sediment away; let what is prepared rest about a minute, and then pour it off as before, which will purify the whiting and render it free from all dirt and grittiness.—When this is done, let the whiting settle, and then pour the water from it; after which, lay it on the chalk to dry, and keep it for use, either for white crayons, or the purpose of preparing tints with other colours, for with this, all other tints may be safely prepared.

The student must be provided with a large, flexible pallet-knife, a large stone and muller to levigate the colours, two or three large pieces of chalk to absorb the moisture from the colours after they are levigated, a piece of flat glass to prevent the moisture from being absorbed too much, till the colours are rolled into form, and vessels for water, spirits, &c. as necessity and convenience shall direct.

R E D S.

C A R M I N E *and* L A K E.

It is rather difficult to procure either good carmine or good lake. Good carmine is inclined to the vermilion tint, and should be an impalpable powder, and good lake to the carmine tint. The carmine crayons are prepared in the following manner:

R 2

As

As their texture is inclinable to hardness, instead of grinding and rolling them, take a sufficient quantity of carmine, lay it upon the grinding-stone, mix it with a levigating knife with spirits of wine, till it becomes smooth and even; yet the less friction produced by the knife the better. The chalk-stone being ready, lay the colour upon it to absorb the spirit, but be careful that it is laid on in a proper shape for painting.

The simple colour being prepared, the next step is to compose the different tints by a mixture with whiting; the proportion to be observed consisting of twenty gradations to one, which may be clearly understood by the following directions. Take some of the simple colour, and levigate it with spirits of wine, adding about one part of washed whiting to three parts of carmine, of which, when properly incorporated, make two parcels. The next gradation should be composed of equal quantities of carmine and whiting, of which four crayons may be made. The third composition should have one fourth carmine, and three fourths whiting, of this make six crayons, which will be a good proportion with the rest. The last tint should be made of whiting, very faintly tinged with carmine, of which make about eight crayons, which will compleat the abovementioned proportion.

N. B. Though these tints made with whiting may be rolled, yet the pure carmine will not bear it, but must be left on the chalk-stone till perfectly dry.

L A K E

Is a colour very apt to be hard; to prevent which the student must observe the following particulars;

Take

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Take about half the quantity of lake intended for the crayons, and grind it very fine with spirits of wine; let it dry and then pulverize it, which is easily done if the lake is good; then take the other half, and grind it with spirits, after which mix it with the pulverized lake, and lay it out directly in crayons on the chalk. The colour will not bear rolling. The simple colour being thus prepared, proceed with the compound crayons, as directed before, and in the same degrees of gradation as the carmine teints.

VERMILLION, *or* NATIVE CINNABAR.

The best is inclined to the carmine teint. To prepare this colour mix it on the stone with soft water, or spirits, after which it may be rolled into crayons.

B L U E S.

P R U S S I A N B L U E

Is a colour very apt to bind, and is rendered soft with more difficulty than carmine and lake. The same method of preparation is to be followed with this as directed with respect to lake, only it is necessary to grind a larger quantity of the pure colour, as it is chiefly used for painting draperies.

B L U E V E R D I T E R

Is a colour naturally gritty, and therefore it is necessary to wash it well. Its particles are so coarse as to require some binding matter to unite them, otherwise the crayons will never adhere together. To accomplish this, take a quantity sufficient to form

two

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two or three crayons, to which add a piece of slack-plaster of Paris about the size of a pea; mix these well together, and form the crayons upon the chalk. This blue is extremely brilliant, and will be of great use in heightening draperies, &c.

G R E E N S.

BRILLIANT greens are produced with great difficulty, which may be procured of those who make it their business to prepare them, yet the following compositions will be found useful: Take yellow oker, and after grinding it with spirits, mix it with the powder of Prussian blue, then temper it with a knife, and lay the crayons on the chalk, without rolling them: Besides this use king's yellow, mixed with Prussian blue, brown oker and Prussian blue.* The crayons made of these last may be rolled.

Y E L L O W S.

K I N G ' S Y E L L O W

Is the most useful and the most brilliant, levigated with spirits of wine, and compose the different tints as before directed. Yellow oker and Naples yellow ground with spirits will make useful crayons.

O R A N G E

Is produced with king's-yellow and vermillion ground together with spirits, and the tints formed as in other cases, but no great quantity of them is required.

BROWNS.

* Roman oker and Prussian blue mixed in different proportions will be useful.

B R O W N S.

C U L L E N S - E A R T H

Is a fine dark brown. After six or eight of the simple crayons are prepared, several rich compound tints may be produced from it, by a mixture with carmine in various degrees; black, carmine, and this colour, mixed together, make useful tints for painting hair; several gradations may be produced from each of these by a mixture with whiting.

U M B E R

May be treated in just the same manner, only it is necessary to levigate it with spirits of wine.

P U R P L E S.

PRUSSIAN blue ground with spirits, and mixed with pulverized lake, will produce a good purple. Carmine thus mixed with Prussian blue will produce a purple something different from the former. Various tints may be made from either of these compounds by a mixture with whiting.

B L A C K.

L A M P - B L A C K,

Is the only full black that can be used with safety, as all others are subject to mildew.

Cinnabar mixed with carmine.—This is a composition of great use, and tints made from this with whiting will be found very serviceable.

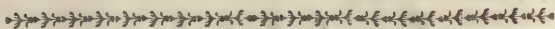
Carmine and black is another good compound, of which five or six gradations should be made, some partaking more of the black, and others having the carmine most predominant, besides several tints by a mixture with whiting.

Cinnabar

Cinnabar and black is also a very useful compound, from which several different teints should be made.

Prussian blue and black is another good compound, and will be found of singular service in painting draperies.

It is impossible to lay down rules for forming every tint necessary in composing a set of crayons, there being many accidental compositions, entirely dependent on fancy and opinion. The student should make it a rule to save the leavings of his colours, for of these he may form various teints, which will occasionally be useful.



OF ROLLING *the* CRAYONS *and* DISPOSING *them* for PAINTING.

THE different compositions of colours must be cut into a proper magnitude after they are prepared, in order to be rolled into pastils for the convenience of using them. Each crayon should be formed in the left hand with the ball of the right, first formed cylindrically, and then tapered at each end. If the composition is too dry, dip the finger in water; if too wet the composition must be laid upon the chalk again to absorb more of the moisture. The crayons should be rolled as quick as possible; and when finished, must be laid upon the chalk again, to absorb all remaining moisture. After the gradation of teints from one colour are formed, the chalk and the grinding-stone should be well scraped and cleansed with water before it is used for another colour.

When

When the set of crayons is completed according to the rules prescribed, they should be arranged in classes for the convenience of painting with them. Some thin drawers, divided into a number of partitions, is the most convenient method of disposing them properly. The crayons should be deposited according to the several gradations of light. The bottom of the partitions must be covered with bran, as a bed for the colours, because it not only preserves them clean, but prevents their breaking.

The box made use of when the student paints, should be about a foot square, with nine partitions. In the upper corner, on the left hand (supposing the box to be in the lap when he paints) let him place the black and grey crayons, those being the most seldom used; in the second partition, the blues; in the third, the greens and browns; in the first partition on the left hand of the second row, the carmines, lakes, vermillions, and all deep reds; the yellows and orange in the middle, and the pearly tints next; and as these last are of a very delicate nature, they must be kept very clean, that the gradations of colour may be easily distinguished: In the lowest row, let the first partition contain a piece of fine linen rag to wipe the crayons with while they are using; the second, all the pure lake and vermilion tints; and the other partition may contain those tints, which, from their complex nature, cannot be classed with any of the former.

For ENAMEL GROUNDS.

THE matter of the enamel must be first finely levigated and searced : and the body to be enamelled should be made perfectly clean. The enamel must be then laid on as even as possible by a brush or pencil, being first tempered with oil of spike ; and the distance of time betwixt the laying on the ground and burning the piece should not be too great ; because the oil will exhale, and leave the matter of the enamel a dry incohering powder ; which will be liable to be rubbed or shaken off by the least violence. This is the common method ; but there is a much better way of managing this part of the work by means of a searce ; in which the enamel is spread with very little trouble, and the greatest part of the oil of spike saved. The method of performing this is, to rub the surface to be enamelled over with oil of spike ; and then, being laid on a sheet of paper, or piece of leather, to save that part of the enamel which does not fall on a proper object, to searce the matter upon the oiled surface till it lie of a proper thickness. But great care must be taken in this method of proceeding, not to shake or move too forcibly the pieces of work thus covered with the powdered enamel.

It is usual to add oil of turpentine to the oils of spike or lavender, in order to make them go further, and save the expence attending the free use of them ; and others add also a little olive or linseed oil, or some, in the place of them, crude turpentine. The use of the spirit of turpentine is very allowable ; for it is the same for this purpose as the
oils

oils of spike or lavender, except that it wants the glutinous quality which makes them serviceable in spreading the enamel. But with respect to the use of the oils of olive and linseed, or any other substantial oil, it is very detrimental: tending to reduce the metalline calxes; and leaving a small proportion of black coal or ashes, which must necessarily injure the white colour of the ground.

When plates, as in the case of pictures, dial-plates, &c. are to be enamelled, they should always be made convex on the outside, and concave within; and all pieces of enamel, formed of metal, where the figure does not admit of their being thick and solid, should be of the same kind or form. Otherwise they will be very apt to warp in the heat, and cannot be brought straight, after they are taken out of the fire, without cracking the enamel. For this reason, likewise, it is proper to enamel the work all over, as well on the wrong as right sides, to prevent the heat from calcining the metal; which would both contribute to its warping, and weaken the texture of it.

The enamel being laid on the body to be enamelled, when the fixt muffle is used, the piece must be gently lifted on to the false bottom; and put in that state into the muffle fixt in a furnace, by thrusting the false bottom into it as far as it will go. But it is best to defer this till the fire be perfectly in order, which may be known by putting a bit of tile or china with some enamel on it of the same tone with that used as a proof; and another proof of the same kind may be also put along with the work into the muffle; which, being taken out, may shew how the operation proceeds.

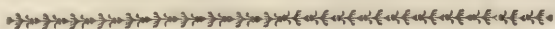
Pit-coal may be used in the furnace, where enamel is burnt with the fixt muffle, or in coffins; which is indeed one principal conveniency attending the use of them; as it saves a considerable expence of charcoal. But where the open muffle is used, charcoal alone should be employed; as the fumes of mineral coal are very detrimental to some colours, and destructive of the grounds, if whitened by arsenic, as the common white glass.

The colours being prepared, they must be reduced to powder by due levigation, and washing over, where they are required to be extremely fine, and there is no unvitriified salt in the mixture. They must then be tempered on a china or Dutch tile with oil of spike or lavender, to which most artists add likewise oil of turpentine; and some (but I think erroneously, as I have before mentioned) a little linseed or olive oil, and in this state they are to be used as paint of any other kind. But it should be avoided to mix more of the colours with the essential oils than will be immediately used; because they dry away extremely fast, and would not only be wasted, but give a cohesion to the particles of the colours, that would make them work less freely when again diluted with oil.

The colours being thus laid on the pieces to be painted, the proceeding must be in all respects the same as with the grounds, in whatever manner they are to be burnt, either in the muffles or coffins. But greater nicety must be observed with respect to the fire, as the effects of any error in that point are of much greater consequence in the burning the colours than the grounds; especially if the
white

white of the grounds be formed from the calx of tin or antimony, and not arsenic.

Pit-coal, as was above observed, may be employed for burning as well the colours as the grounds, where the muffle or coffins are used; or any other method pursued that wholly hinders the smoke and fumes from having any access to the enamel.



Of ENAMEL PAINTING.

ENAMEL painting differs from all other kinds, in the vehicle employed for the colours (to hold the parts together, and bind them to the ground they are laid upon); this is glass or some vitreous body, which being mixed with the colours, and fused, or melted, by means of heat, becomes fluid; and having incorporated with the colours in that state, forms together with them, a hard mass when grown cold. It answers, therefore, the same end in this, as oil, gum-water, size, or varnish, in the other kinds of painting.

The glass or vitreous body, applied to this purpose of mixing with the colours, in order to bind them to the grounds, is called a flux; and makes one of the principal substances used in enamel painting. When this flux is easily fusible, that is to say, melts with a less degree of heat, it is, in the stile of those who work in enamel said to be soft, and when it is reluctant to melt, and requires a greater degree of heat, it is called hard. These terms are as well applied to the matter of the enamel grounds, and all other vitreous substances concerned, as to the fluxes. It is, in general, a
perfection

perfection of the flux to be soft, or run easily into fusion. But the great point, with respect to this particular, is, that when several mixtures of colours and fluxes are used at the same time, they should all correspond to each other in the degree of this quality. Otherwise some would be rendered too fluid, and perhaps run the matter of the enamel ground into fusion, and mix with it, while others remained solid and insufficiently fused themselves. It is always necessary, likewise, that the enamel of the ground should be considerably harder than the mixtures for the colours; for if they both melt with the same degree of heat, they will necessarily run together.

It being requisite that the body painted in enamel should undergo a heat sufficient to melt soft glass, the matter of such body can only be gold, silver, copper, porcelan, or china-ware, hard glass, and earthenware. And where the metals are used, if the painting be of the nature of a picture, or demand a variety of colours, it is necessary that a ground of white, or some other colour, should be laid on the metal; the body of which ground must necessarily be of the same vitreous nature as the flux, but harder. As nothing else can endure so great a heat that is capable of incorporating with, and binding the matter of the white, or other colour, to the surface of the metal. The ground, therefore, makes another principal substance used in enamel painting.

The third substance is the colour, which must likewise be a body capable of suffering the heat of melted glass; and such as will either itself be converted into glass, or kindly incorporate with it, in a melted state. This, of course, confines the matter of such colour to metals, earths, or other mineral bodies;
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all vegetable and animal substances being calcined and analized, with a less degree of heat than the lowest sufficient to work enamel.

The fourth kind of substance is what I shall call the secondary vehicle ; which is, some fluid body for laying on the ground, and working with the pencil, the flux and colours when mixt together ; since, as they form only a dry powder, they could not be used as paint without some such medium. But as this is to serve only for spreading and laying on the matter of the enamel, and not, like other vehicles, to assist in holding the colours together, and binding them to the ground (that being in this kind of painting the office of the flux) it is necessary, that it should be some such substance as will evaporate and dry away without leaving any part behind. As it would otherwise be heterogeneous matter, with regard to the enamel ; and consequently injurious to it. Essential oils have been, therefore used for this purpose, as they have the quality of wholly drying away on the first approach of heat, together with a slight unduosity, which renders them capable of making the matter of the enamel work properly with the pencil.

The preparation of these several substances have been in a great measure monopolized by the Ventians, except what were prepared at Dresden, since the establishment of the china manufactories. The few others who have had any knowledge of this matter, have practised the preparing only some kinds ; and even at present, there are, perhaps, none in this country, who make more than a small part of the variety necessary. For though many possess the knowledge of some particular articles, yet they are ignorant with regard to others, which are again, perhaps
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known to those who are ignorant of these. As there has been hitherto no means afforded to the practisers of it, of learning the particulars of this art in a system, and a deeper knowledge of the principles and practice of chemistry is requisite to the attaining it, without being taught, than could well fall to the share of painters, or other artists, I shall, therefore, be more minute in my instructions for the making the several kinds of the grounds, fluxes, and colours; in order that they who are concerned in, or may be desirous to apply themselves to the art of painting in enamel, which is now become the basis of a considerable manufacture in this country, may furnish themselves with whatever is necessary in its greatest perfection.

Besides the knowledge of the preparation of the above substances, and of that part of the art of using them, which belongs to painters in general, there is another requisite. This is the burning, as it is called, the grounds, in order to forming them on the body to be painted, or enamelled; as also the colours with the fluxes after they are laid on the grounds. What is meant by burning, is the giving such a heat to the matter, when laid on the body to be painted, as will fuse or melt it; and consequently give to the flux, or vitreous part of the composition, the proper qualities of a vehicle for binding the colours to the ground, and holding the parts together. As this requires a particular apparatus, I shall endeavour to shew the method of constructing it in the most expeditious and easy manner; and give such cautions for the conduct of the operation, both for burning the grounds and painting, as may best teach those, who are less experienced in it, to attain to perfection in this art. It cannot be expected, neverthe-

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less, considering the nicety of the subject, such directions can be given, as will insure success in the first trials, with regard to several of the processes, or even the general operations; but whoever will make themselves masters of the principles on which they depend, which are all along intimated, will easily be able to correct their own errors.

A judgment formed by some little experience, is likewise requisite for the preparing well the colours with certainty. For as different parcels of the same substance vary frequently in their qualities, with regard to the degree or proportion, it is necessary to make allowance accordingly in the proportion of the quantities in the mixtures. This cannot be done till some little previous trial be made; and the power of judging of them be gained by an experimental acquaintance with them. But as the materials in general are very cheap, and the experiments may be made in the same fire where actual business is done; whoever would excel in the art of preparing and using enamels, should take a considerable scope of experimental enquiry into the effect of all the various proportions and commixtures of the substances used.

Of the Substances used for forming Fluxes.

Minum, or red lead, is used as a fluxing body, for forming the enamel for grounds; as also in compounding fluxes for the colours. It requires no preparation for these purposes; only it is proper it should be pure; which may be known by the method before given, page 47. This flux renders the enamel soft; but producing some proportion of yellow colour, is not fit for all uses.

Fixt alkaline salt of vegetables, is sometime used also, in forming the mixture for enamel grounds; as

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likewise in some compositions of fluxes for the colours. It makes a less soft enamel than the lead, but is free from yellow, or any other colour; and therefore proper for some purposes.

Borax is a salt of very peculiar qualities; amongst which, is that of promoting vitrification, and the fusion of any glass when vitrified, in a greater degree than any other substance known; on which account it is of the greatest consequence, in forming fluxes for enamel. It requires, nevertheless, either to be previously calcined or brought to a vitreous state, which it suffers from the application of moderate heat alone; and it must also be finely powdered before it be mixed with other ingredients in fluxes. Its use is not much known in common practice; though of the greatest consequence to the art of enamelling. As not only a set of softer colours may be produced by the aid of it, than can be otherwise had; but the degree of each may be brought to correspond, by the employing it in different proportions, according to the respective hardness of the other ingredients, which differ so much, as not to be regulated justly by any other means.

Common salt may be also used as a flux in enamelling, particularly where there is occasion for glazings: as it is not only extremely fluid, and free of tenacity when used, but also less subject to crack than any other vitreous body whatever. But for fluxes for grounds and colours in enamel, it is not frequently necessary to multiply ingredients, as the above three substances may, when properly applied, sufficiently answer most purposes. The same reasoning extends to nitre and arsenic; which, though they have the qualities of fluxes, possess yet along with
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them such others, with respect to their effect on several of the substances that compose the colours, as renders the methods of using them difficult and complex.

Of the substances used for forming the body of enamel, or fluxes.

White sand is used as a body for the fluxes and grounds of enamel: it should be reduced previously to an impalpable powder, in order that it may be mixed more intimately with the other ingredients; which not only accelerates the vitrification, but renders the glass much more perfect. The kind of sand proper for this purpose, is that brought from Lynn, in Norfolk, and called by the name of that place.

Flints are used for the same purpose as the white sand; and it is proper to use them, when that cannot be procured of the right kind. They require to be calcined before they are applied to any purpose of vitrification. This is to be done, by putting them into any fire, and continuing them there till the whole substance become white; when they must be taken out; and, while in their full heat, immersed in cold water, and kept there for some time. By such treatment, they will be rendered of a very brittle and calcarious texture, and very easy to be powdered; which must be done to a perfect degree, for the reason above given. Where small quantities of the matter of any kind of enamel is to be prepared, calcined flints are preferable to sand; as they are much more easily reduced to an impalpable powder, and the trouble of the previous calcination is very little.

There is a sort of stone, which the French call *milon*, that forms the upper crust, and lies round the free-stone in most quarries. This stone will lose its tenacity in a moderate fire, and, when calcined, runs much sooner into vitrification than either flints or sand. It is therefore, when it can be obtained, a better matter for the body of fluxes or soft enamel, than either of the other. It will, with the same proportion of the fluxing ingredients, make a much softer flux; or, it otherwise admits of the diminution of the proportion of some of them; which, for many experimental reasons, is in certain cases an advantage.

Of the substances used for producing a white colour in enamel, for forming the grounds.

Putty, or calcined tin, is used as a body of colour for the enamel grounds. As tin is very troublesome in calcination, requiring a long continuance of fire, and to be spread into a very thin surface, it is much the best way to procure it for the purposes of enamelling ready calcined, of those who make it their proper business to calcine it, for the use of lapidaries, and other artists who use it. For they have large furnaces, fitly constructed for performing that operation in large quantities, and can consequently afford it much cheaper than it can be prepared in small quantities; besides the sparing the trouble. It must be demanded of them by the name of putty; and care must be taken that it be not sophisticated, which it seldom fails to be before it comes out of their hands for common purposes. The sophistication, which is generally by chalk, lime, or some such white earth, may be thus distinguished. Put
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the putty into a crucible with some tallow or other greafe; and give it the heat of fusion, or what is sufficient to melt it; supplying the greafe in fresh quantities as it burns away, till the calcined tin appears to have regained its metallic state. Suffer then the remainder of the greafe to burn away, and the chalk or earth, if any were mixed with it, will be found swimming on the surface of the metal; to which however the ashes of the greafe must be supposed to have added some little quantity. There is, nevertheless, another body, with which the putty or calx of tin may be adulterated, that will not discover itself by this method of reduction of the tin. It is white lead, which, in this manner of treatment, would run into fusion, and mix with the tin: and could therefore not be distinguished from it. But it may be easily rendered perceptible by another manner of proceeding; which is, to take the putty suspected to be adulterated with it, and having put it into a crucible, without any admixture, and inverted another crucible over it, as a cover, to give it a moderate heat, carefully avoiding that the smoke or coal of the fire may have any access to it to change its colour. If there be any white lead mixed with the putty, it will shew itself, when removed from the fire, and become cold in a yellow or brown colour. If no such colour supervene, but the putty appear equally white as before it was heated, a conclusion may be safely made, that it was not adulterated by white lead; or that, if sophisticated at all, it must be by some white earth, which may be made perceptible by the reduction of tin in the manner before mentioned.

Ultramarine

Ultramarine (the preparation of which we have before given) is used in enamel, where very bright blues of a lighter tint are wanted; and sometimes indeed, in other cases, by those who do not understand the right use of zaffer and smalt. But there are few instances where zaffer, when perfectly good, fluxed with borax and a little calcined flint, or Venetian glass, to take off the fusible quality of the borax, will not equally well answer with the best ultramarine. The ultramarine requires no preparation when used in enamel painting, previously to its being mixt with the proper flux, and what relates to its general qualities, and the means of distinguishing its goodness or genuineness, we have, along with its preparation, before taught, p. 54, and the following:

Ultramarine ashes are used, where light semi-transparent blues are wanted. But they are so frequently adulterated with precipitations of copper, which, of course, turn green on fluxing, that it is very necessary to be cautious, in the use of any parcel not previously tried.

Zaffer is used for producing blue, green, purple, and black colours in enamel. It is an earth, obtained by calcining a kind of stone, called cobalt; and when it is mixed with any kind of vitreous bodies, it vitrifies, at the same time assuming a strong blue colour; but for the most part verging to the purple. It is to be had in a state proper for use, of those colourmen who make it their particular business to supply the glass-makers with colours. The goodness of zaffer can scarcely be known but by an actual trial of it; and comparing the effect of it with that of some other known to be good, and used in the same proportion.

Magnesia

Magnesia is an earth, which, when fluxed with any vitreous body, produces a broken crimson, or foul rose colour. It is to be had, prepared fit for use, except a more perfect levigation, from those who sell colours to the glass-makers. It is useful not only for some purposes as a red, but for the several compositions for black, purple, and some browns. The goodness of the magnesia must be determined by the same means as that of zaffer.

Smalt is, as before mentioned, zaffer vitrified with proper additions; which are generally fixt alkaline salts and sands, or calcined flints, which are sometimes used as a blue in enamel. But being hard, it requires, for such purposes, to be used with a flux, which increasing the body of glass in too great a proportion for the tinge, is apt to dilute the colour too much, where great force is wanted; therefore the use of the zaffer itself is in most cases preferable. There have nevertheless been, as was above observed, some parcels of smalt, or vitrified calx of cobalt, brought from Saxony, which are of an extreme strong body of colour, and will bear any proportion of flux necessary to render them as soft as may be required, without weakening the colour too much, for any purpose. Common smalt, however, ground very fine, and mixt with a fourth part of its weight of borax (which is much the most powerful and kindly flux for zaffer) will run pretty well, and may be used where either a full colour is not demanded, or where the work will admit of the colours being laid on thick. The goodness of smalt may be judged of by its bright and deep colour: and the less it inclines to the purple the better. In order to judge of the strength of the colour, the smalt should be
reduced

reduced to a fine powder : for in a groffer state, every degree of fineness renders it so different, that a judgment cannot be easily formed of it. Smalt is to be had of all colourmen, and is not subject to any adulterations, which would not be obvious on inspection.

Gold is used in enamel to produce a crimson or ruby colour ; which, by the mistaken sense of the Latin word *purpureus*, has been called purple by all the English and French writers. It must be previously reduced to the state of a precipitated powder, by dissolving in aqua regia ; and making a precipitation by means of tin, fixt alkaline salt, or some other metallic, or alkaline body.

Silver is used for producing a yellow colour in enamel. It must be previously reduced to the state of a powder ; which may be done either by precipitation from spirit of nitre, or by calcination with sulphur. The precipitation of silver from spirit of nitre, may be performed by dissolving an ounce of silver, in two or three ounces of spirit of nitre ; and precipitating and edulcorating it.

Copper is used in enamel painting, for the forming, green, blue, and red colours ; but it must be previously either calcined, or reduced to the state of a powder by precipitation.

Iron is used to produce an orange red, or foul scarlet colour in enamel ; as also a transparent yellow ; and to assist, likewise, in the formation of greens, and other compound colours. It is prepared many ways, both by corrosion and precipitation ; some of which indeed make a real difference, but most of them lead to the same end.

Antimony is used for producing a yellow colour in enamel, as well as the white before mentioned ;
and

and indeed, it is the most useful, and most used of any substance whatever for that purpose. It is prepared only by levigation; to which its texture, notwithstanding its being a semi-metal, very well suits.

Glass of antimony is also used sometimes, in enamel painting; being itself a fine transparent orange colour. But as it wants body, it has no great effect but in compositions.

Orpiment has been also used in enamel for producing a yellow colour; but it is very tender with regard to the fire, and requires so soft a flux, while, at the same time, antimony, properly managed, will so well supply the place of it, that it is rarely used.

Powdered bricks have been also used for compounding yellow colours in enamel; but as they act only in consequence of the oker they contain, they are certainly inferior to the prepared okers we have given.

The most active flux amongst salts is borax; which, indeed, possesses this power in the greatest degree hitherto known of any simple whatever. The next is lead; which vitrifies with a very moderate degree of heat, and assimilates to glass with itself, not only many kinds of earth, but all metals and semi-metals; except gold and silver in their entire state. Arsenic is the next powerful flux, only it requires to be fixed, by conjoining it with some other body already vitrified; otherwise it sublimes and flies away before it arrives at the vitrefactive heat. The several kinds of salts have the next degree of fluxing power; and among them sea salt possesses the greatest. But they are not sufficiently strong themselves to form an enamel flux soft enough to be used in painting. Though, as they are colourless, which

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is not the case of vitrified lead, they are very necessary to be compounded with lead; or used in its place, assisted by borax, where absence of every degree of colour is necessary in the flux.



PAINTING *upon* GLASS.

THE antient manner of painting upon glass was very simple, and consequently very easy; it consisted in the mere arrangement of pieces of glass of different colours in some sort of symmetry, and constituted what is now called Mosaic work.

In process of time they came to attempt more regular designs, and also to represent figures heightened with all their shades: Yet they proceeded no farther than the contours of the figures in black with water-colours, and hatching the draperies after the same manner, on glasses of the colour of the object they designed to paint. For the carnation, they used glass of a bright red colour; and upon this they drew the principal lineaments of the face, &c. with black.

But in time, the taste for this sort of painting improving considerably, and the art being found applicable to the adorning of churches, &c. they found out means of incorporating the colours in the glass itself, by heating them in the fire to a proper degree; having first laid on the colours.

The colours used in painting or staining of glass, are very different from those used in painting either in water or oil colours.

For black, take scales of iron, one ounce; scales of copper, one ounce; jet, half an ounce; reduce them
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to powder, and mix them. For blue, take powder of blue, one pound; sal nitre, half a pound; mix them and grind them well together. For carnation, take red chalk, eight ounces; iron scales and litharge of silver, of each two ounces; gum arabic, half an ounce; dissolve in water; grind all together for half an hour as stiff as you can; then put it in a glass and stir it well, and let it stand to settle fourteen days. For green, take red lead, one pound; scales of copper, one pound; and flint, five pounds; divide them into three parts; and add to them as much sal nitre; put them into a crucible, and melt them with a strong fire; and when it is cold, powder it, and grind it on a porphyry. For gold colour, take silver, an ounce; antimony half an ounce; melt them in a crucible; then pound the mass to powder, and grind it on a copper-plate; add to it yellow oker, or brick dust calcined again, fifteen ounces; and grind them well together with water. For purple, take minum, one pound; brown stone, one pound; white flint, five pounds; divide them into three parts, and add to them as much sal nitre as one of these parts; calcine, melt, and grind it as you did the green. For red, take jet, four ounces; litharge of silver, two ounces; red chalk, one ounce; powder them fine, and mix them. For white take jet, two parts; white flint, ground on a glass very fine, one part; mix them. For yellow take Spanish brown, ten parts; leaf silver, one part; antimony, half a part; put all into a crucible, and calcine them well.

Those beautiful works which were made in the glass-houses were of two kinds. In some, the colour was diffused through the whole substance of the glass. In others, which were the more common, the

colour was only on one side, scarce penetrating within the substance above one third of a line; though this was more or less according to the nature of the colour; the yellow being always found to enter the deepest. These last, though not so strong and beautiful as the former were of more advantage to the workmen, by reason that on the same glass, though already coloured, they could shew other kind of colours, where there was occasion to embroider draperies, enrich them with foliages, or represent other ornaments of gold, silver, &c.

In order to this, they made use of emery, grinding or wearing down the surface of the glass, till such time as they were got through the colour to the clear glass. This done, they applied the proper colours on the other side of the glass. By this means, the new colours were hindered from running and mixing with the former, when they exposed the glasses to the fire.

When indeed the ornaments were to appear white, the glass was only bared of its colour with emery, without tinging the place with any colour at all; and this was the manner by which they wrought their lights and heightenings on all kinds of colour.

The first thing to be done, in order to paint, or stain glass, in the modern way, is to design, and even colour the whole subject on paper. Then they chuse such pieces of glass as are clear, even, and smooth, and proper to receive the several parts, and proceed to distribute the design itself, or papers it is drawn on, into pieces suitable to those of the glass; always taking care that the glasses may join in the contours of the figures, and the folds of the draperies; that the carnations, and other finer parts may not be impaired
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by the lead with which the pieces are to be joined together. The distribution being made, they mark all the glasses as well as papers, that they may be known again: which done, applying every part of the design upon the glass intended for it, they copy or transfer, the design upon this glass with the black colour diluted in gum water, by tracing and following all the lines and strokes as they appear through the glass, with the point of a pencil.

When these strokes are well dried, which will happen in about two days, the work being only in black and white; they give a slight wash over with urine, gum arabic, and a little black: and repeat it several times, according as the shades are desired to be heightened, with this precaution, never to apply a new wash till the former is sufficiently dried.

This done, the lights and risings are given by rubbing off the colour in the respective places with a wooden point, or the handle of a pencil.

As to the other colours abovementioned, they are used with gum water, much as in painting in miniature; taking care to apply them lightly for fear of effacing the outlines of the design; or even, for the greater security, to apply them on the other side; especially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard must always be had not to lay colour on colour, or lay on a new lay, till such time as the former are well dried.

It may be added, that the yellow is the only colour that penetrates through the glass, and incorporates therewith by the fire; the rest, and particularly the blue, which is very difficult to use, remaining

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maining on the surface, or at least entering very little. When the painting of all the pieces is finished, they are carried to the furnace, or oven, to anneal, or bake the colours.

The furnace here used is small, built of brick, from eighteen to thirty inches square; at six inches from the bottom is an aperture to put in the fuel, and maintain the fire. Over this aperture is a grate, made of three-square bars of iron, which traverse the furnace, and divide it into two parts. Two inches above this partition, is another little aperture, through which they take out pieces to examine how the coction goes forward. On the grate is placed a square earthen pan, six or seven inches deep; and five or six inches less every way than the perimeter or the furnace. On the one side hereof is a little aperture, through which to make trials, placed directly opposite to that of the furnaces destined for the same end. In this pan are the pieces of glass to be placed in the following manner: First, the bottom of the pan is covered with three strata, or layers, of quick lime pulverized; those strata being separated by two others of old broken glass, the design whereof is to secure the painted glass from the too intense heat of the fire. This done, the glasses are laid horizontally on the last or uppermost layer of lime.

The first row of glass they cover over with a layer of the same powder, an inch deep; and over this they lay another range of glasses, and thus alternately till the pan is quite full; taking care that the whole heap always end with a layer of the lime powder.

The pan being thus prepared, they cover up the furnace with tiles, on a square table of earthenware, closely luted all round; only leaving five little apertures, one at each corner, and another in the middle, to serve as chimnies. Things thus disposed, there remains nothing but to give the fire to the work. The fire for the first two hours must be very moderate, and must be increased in proportion as the coction advances, for the space of ten or twelve hours; in which time it is usually compleated. At last the fire, which at first was charcoal, is to be of dry wood, so that the flame covers the whole pan, and even issues out at the chimneys.

During the last hours, they make essays, from time to time, by taking out pieces laid for the purpose, through the little aperture of the furnace and pan, to see whether the yellow be perfect, and the other colours in good order. When the annealing is thought sufficient, they proceed with great haste to extinguish the fire, which otherwise would soon burn the colours, and break the glasses.



Of J A P A N N I N G.

BY jappanning is to be here understood the art of covering bodies by grounds of opake colours in varnish; which may be either afterwards decorated by paintings or gilding, or left in a plain state. This is not at present practised so frequently on chairs, tables and other furniture of houses, except tea waiters, as formerly. But the introduction of it for ornamenting coaches, snuff-boxes and skreens,
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in which there is a rivalry betwixt ourselves and the French, renders the cultivation and propagation of this art of great importance to commerce. I shall therefore be more explicit in shewing the methods both now and formerly in use; with the application of each to the several purposes to which they are best adapted; and point out, at the same time, several very material improvements, that are at present enjoyed only by particular persons; or not at all hitherto brought into practice.

The substances which admit of being japanned are almost every kind that are dry and rigid, and not too flexible; as wood, metals, leather, and paper prepared.

Wood and metals do not require any other preparation, but to have their surfaces perfectly even and clean. But leather should be securely strained either on frames, or on boards; as its bending, or forming folds, would otherwise crack and force off the coats of varnish. Paper also should be treated in the same manner, and have a previous strong coat of some kind of size; but it is rarely made the subject of japanning till it is converted into papier mache, or wrought by other means, into such form, that its original state, particularly with respect to flexibility, is lost.

One principal variation in the manner of japanning is, the using or omitting any priming or under coat on the work to be japanned. In the older practice, such priming was always used; and is at present retained in the French manner of japanning coaches and snuff boxes of the papier mache. But in the Birmingham manufacture, it has been always rejected. The advantage of using such priming or
under

under coat is, that it makes a saving in the quantity of varnish used; because the matter of which the priming is composed fills up the inequalities of the body to be varnished, and makes it easy, by means of rubbing and water-polishing, to gain an even surface for the varnish. This was therefore such a convenience in the case of wood, as the giving a hardness and firmness to the ground was also in the case of leather, that it became an established method; and is therefore retained, even in the instance of the papier mache, by the French, who applied the received method of japanning to that kind of work on its introduction. There is, nevertheless, this inconvenience always attending the use of an under coat of size, that the japan coats of varnish and colour will be constantly liable to be cracked and peeled off, by any violence, and will not endure near so long as the bodies japanned in the same manner, but without any such priming. This may be easily observed in comparing the wear of the Paris and Birmingham snuff-boxes; which latter, when good of their kind, never peel or crack, or suffer any damage, unless by great violence, and such a continued rubbing, as wastes away the substance of the varnish; while the japan coats of the Parisian boxes crack and fly off in flakes, whenever any knock or fall, particularly near the edges, exposes them to be injured. But the Birmingham manufacturers, who originally practised the japanning only on metals, to which the reason above given for the use of priming did not extend, and who took up this art of themselves as an invention, of course omitted at first the use of any such under coat; and not finding it more necessary

in the instance of papier mache, than on metals, continue still to reject it. On which account the boxes of their manufacture are, with regard to the wear, much better than the French.

The laying on the colours with varnish instead of gum water, is also another variation from the method of japanning formerly practised. But the much greater strength of the work, where they are laid on in varnish or oil, has occasioned this way to be exploded, with the greatest reason in all regular manufactures. However, they who may practise japanning on cabinets, or other such pieces, as are not exposed to much wear or violence, for their amusement only, and consequently may not find it worth their while to encumber themselves with the preparations necessary for the other methods, may paint with water colours on an under coat laid on the wood, or other substance, of which the piece to be japanned is formed; and then finish with the proper coats of varnish, according to the methods below taught. If the colours are tempered with the strongest isinglass size and honey, instead of gum water, and laid on very flat and even, the work will not be much inferior in appearance to that done by the other method; and will last as long as the common old japan work, except the best kinds of the true japan.

It is practised likewise, in imitation of what is sometimes done in the Indian work, to paint with water colours on grounds of gold; in which case the isinglass size, with sugar-candy or honey, as above directed, is the best vehicle.

Imitations are also made of japan work, by colouring prints, gluing them to wood work, and then giving them a shining appearance, by the use of some white varnish.

Of japan grounds.—The proper japan grounds are either such as are formed by the varnish and colour, where the whole is to remain of one simple colour; or by the varnish either coloured, or without colour, on which some painting, or other decoration, is afterwards to be laid. It is necessary, however, before I proceed to speak of the particular grounds, to shew the manner of laying on the priming or under coat, where any such is used.

This priming is of the same nature with that called clear coating (or vulgarly clear coaling) practised erroneously by the house-painters; and consists only in laying on, and drying in the most even manner, a composition of size and whiting. The common size has been generally used for this purpose; but where the work is of a nicer kind, it is better to employ the glovers or the parchment size; and if a third of isinglass be added, it will be still better; and if not laid on too thick, much less liable to peel and crack. The work should be prepared for this priming, by being well smoothed with the fish-skin, or glass-flaver; and being made thoroughly clean, should be brushed over once or twice with hot size, diluted with two thirds of water, if it be of the common strength. The priming should then be laid on with a brush as even as possible, and should be formed of a size, whose consistence is betwixt the common kind and glue, mixt with as much whiting as will give it a sufficient body of colour to hide the surface of whatever it is laid upon, but not more.

If the surface be very even, on which the priming is used, two coats of it laid on in this manner, will be sufficient; but if, on trial with a fine wet rag,

it will not receive a proper water polish, on account of any inequalities, not sufficiently filled up and covered, two or more coats must be given it: and whether a greater or less number be used, the work should be smoothed, after the last coat but one is dry, by rubbing it with Dutch rushes. When the last coat is dry, the water polish should be given, by passing over every part of it with a fine rag gently moistened, till the whole appear perfectly plain and even. The priming will then be completed, and the work ready to receive the painting, or coloured varnish: the rest of the proceedings are the same in this case as where no priming is used.

Of common grounds of varnish, which are to be painted upon.—Where wood or leather is to be japanned, and no priming is used, the best preparation is to lay two or three coats of coarse varnish composed in the following manner.

“Take of rectified spirit of wine one pint, and of
“coarse seed-lac and resin each two ounces. Dissolve
“the seed-lac and resin in the spirit; and then strain
“off the varnish.”

This varnish as well as all others formed of spirit of wine, must be laid on in a warm place; and, if it can be conveniently managed, the piece of work to be varnished, should be made warm likewise, and for the same reason, all dampness should be avoided; for either cold or moisture chill this kind of varnish, and prevent its taking proper hold of the substance on which it is laid.

When the work is so prepared, or by the priming with the composition of size and whiting above described, the proper japan ground must be laid on; which is much the best formed of shell-lac varnish,
and

and the colour desired ; if white be not in question, which demands a peculiar treatment, as I shall below explain ; or great brightness be not required, when also other means must be pursued.

The colours used with the shell-lac varnish may be any pigments whatever, which give the teint of the ground desired, and they may be mixt together to form browns or any compound colours ; but, with respect to such as require peculiar methods for the producing them of the first degree of brightness, I shall particularize them below.

The colours for grounds may otherwise be mixed with the white varnishes formed in oil of turpentine ; but these varnishes have no advantages over the shell-lac but in their whiteness, which preserves the brightness of the colours, and they are at the same time greatly inferior in hardness to it.

As metals never require to be under coated with whiting, they may be treated in the same manner as wood or leather, when the under coat is omitted, except in the instances particularly spoken of below.

Of white japan grounds.—The forming a ground perfectly white, and of the first degree of hardness, remains hitherto a desideratum, or matter sought for in the art of japanning. As there are no substances which can be dissolved, so as to form a very hard varnish, but what have too much colour not to deprave the whiteness when laid on of a due thickness over the work, except some very late discoveries not hitherto brought into practice.

The nearest approach, however, to a perfect white varnish, by means already known to the public, is made by the following composition :

“ Take

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“ Take flake white, or white lead, washed over
 “ and ground up with a sixth of its weight of starch,
 “ and then dried ; and temper it properly for spread-
 “ ing, with mastic varnish, or compound them with
 “ gum animi.” Lay these on the body to be japan-
 ned, prepared either with or without the under coat
 of whiting, in the manner as above ordered ; and
 then varnish over it with five or six coats of the fol-
 lowing varnish :

“ Provide any quantity of the best seed-lac, and
 “ pick out of it all the clearest and whitest grains ; re-
 “ serving the more coloured and fouler parts for the
 “ coarser varnishes, such as that abovementioned for
 “ priming or preparing wood or leather. Take of
 “ this picked seed-lac, two ounces, and of gum animi,
 “ three ounces ; and dissolve them, being previously
 “ reduced to a gross powder, in about a quart of spirit
 “ of wine ; and strain off the clear varnish.”

The seed-lac will yet give a slight tinge to this com-
 position, but cannot be omitted, where the varnish is
 wanted to be hard ; though, where a softer will an-
 swer the end, the proportion may be diminished ;
 and a little crude turpentine added to the gum animi,
 to take off the brittleness.

A very good varnish, free entirely from all brittle-
 ness, may be formed, by dissolving as much gum
 animi, as the oil will take, in old nut or poppy oil ;
 which must be made to boil gently, when the gum
 is put into it. The ground of white colour itself
 may be laid on in this varnish, and then a coat or
 two of it may be put over the ground ; but it must
 be well diluted with oil of turpentine when it is
 used. This, though free from brittleness, is, never-
 theless, liable to suffer, by being indented or bruised

by

by any slight strokes; and it will not well bear any polish, but may be brought to a very smooth surface without, if it be judiciously managed in the laying it on. It is likewise somewhat tedious in drying, and will require some time where several coats are laid on, as the last ought not to contain much oil of turpentine. It must be observed likewise, that the gum resin, such as the animi, copal, &c. can never be dissolved in substantial oils, by the medium of heat, without a considerable change in the colour of the oils, by the degree of heat necessary to produce the solution. A method of dissolving gum copal in oil of turpentine is, however, now discovered by a gentleman of great abilities in chemistry; and he has also obtained a method of dissolving amber in the same menstruum, so that we may hope soon to see the art of japanning carried to a consummate degree of perfection; when the public are put in possession of these most important inventions, or the fruits of them.

Of blue japan grounds.—Blue japan grounds may be formed of bright Prussian blue, or of verditer glazed over by Prussian blue, or of smalt. The colour may be best mixed with shell-lac varnish, and brought to a polishing state by five or six coats of varnish of seed-lac. But the varnish, nevertheless, will somewhat injure the colour, by giving to a true blue a cast of green; and fouling, in some degree, a warm blue, by the yellow it contains. Where, therefore, a bright blue is required, and a less degree of hardness can be dispensed with, the method before directed, in the case of white grounds, must be pursued.

Of red japan grounds.—For a scarlet japan ground, vermillion may be used. But the vermillion alone has a glaring effect, that renders it much less beautiful than the crimson produced by glazing it over with carmine or fine lake; or even with rose pink, which has a very good effect used for this purpose. For a very bright crimson, nevertheless, instead of glazing with carmine, the Indian lake, known in shops by the name of safflower, should be used, dissolved in the spirit of which the varnish is compounded (which it readily admits of when good). But in this case, instead of glazing with the shell-lac varnish, the upper or polishing coats need only be used; as they will equally receive and convey the tinge of the Indian lake, which may be actually dissolved by spirit of wine; and this will be found a much cheaper method than using carmine. If, notwithstanding, the highest degree of brightness be required, the white varnishes must be used.

It is at present, however, very difficult to obtain this kind of lake. For it does not appear that more than one considerable quantity was ever brought over, and put into the hands of colourmen; and this being now expended, they have not the means of a fresh supply. It, however, may be easily had from the same place whence the former quantity was procured, by any persons who go thither in the East India company's ships.

Of yellow japan grounds.—For bright yellow grounds, king's yellow, or turpeth mineral, should be employed, either alone or mixed with fine Dutch pink. The effect may be still more heightened, by dissolving powdered turmeric root in the spirit of wine, of which the upper or polishing coat is made; which

which spirit of wine must be strained from off the dregs, before the seed-lac be added to it, to form the varnish.

The seed-lac varnish is not equally injurious here, and with greens, as in the case of other colours; because, being only tinged with a reddish yellow, it is little more than an addition to the force of the colours.

Yellow grounds may be likewise formed of the Dutch pink only; which, when good, will not be wanting in brightness, though extremely cheap.

Of green japan grounds.—Green grounds may be produced by mixing king's yellow and bright Prussian blue; or rather, turpeth mineral and Prussian blue. A cheap, but fouler kind, may be had from verdigrise, with a little of the abovementioned yellows, or Dutch pink. But where a very bright green is wanted, the chrystals of verdigrise (called distilled verdigrise) should be employed; and, to heighten the effect, they should be laid on a ground of leaf gold, which renders the colour extremely brilliant and pleasing.

They may any of them be used successfully with good seed-lac varnish, for the reason before given; but will be still brighter with the white varnish.

Of orange-coloured japan grounds.—Orange-coloured japan grounds may be formed, by mixing vermillion, or red lead, with king's yellow, or Dutch pink; or red orpiment, will make a brighter orange ground than can be produced by any mixture.

Of purple japan grounds.—Purple japan grounds may be produced by the mixture of lake, and Prussian blue; or a fouler kind, by vermillion and Prussian blue. They may be treated as the rest, with respect to the varnish.

Of black japan grounds, to be produced without heat.—Black grounds may be formed by either ivory black, or lamp black; but the former is preferable, where it is perfectly good.

These may be always laid on with the shell-lac varnish; and have their upper or polishing coats of common seed-lac varnish; as the tinge or foulness of the varnish can be here no injury.

Of common black japan grounds on iron or copper, produced by means of heat.—For forming the common black japan grounds by means of heat, the piece of work to be japanned must be painted over with drying oil; and when it is of a moderate dryness, must be put into a stove of such degree of heat, as will change the oil black, without burning it, so as to destroy or weaken its tenacity. The stove should not be too hot when the work is put into it, nor the heat increased too fast; either of which errors would make it blister: but the slower the heat is augmented, and the longer it is continued, provided it be restrained within the due degree, the harder will be the coat of japan. This kind of varnish requires no polish, having received, when properly managed, a sufficient one from the heat.

Of the fine tortoise shell japan ground, produced by means of heat.—The best kind of tortoise shell ground produced by heat is not less valuable for its great hardness, and enduring to be made hotter than boiling water without damage, than for its beautiful appearance. It is to be made by means of a varnish prepared in the following manner:

“ Take of good linseed oil one gallon, and of um-
 “ bre half a pound. Boil them together till the
 “ oil becomes very brown and thick: strain it then
 “ through

“through a coarse cloth, and set it again to boil ;
 “in which state it must be continued till it acquires
 “a pitchy consistence, when it will be fit for use.”

Having prepared thus the varnish, clean well the iron or copper-plate, or rather piece which is to be japanned ; and then lay vermilion tempered with shell-lac varnish, or with drying oil, diluted with oil of turpentine, very thinly, on the places intended to imitate the more transparent parts of the tortoise shell. When the vermilion is dry, brush over the whole with the black varnish, tempered to a due consistence with oil of turpentine ; and when it is set and firm, put the work into a stove, where it may undergo a very strong heat, and it must be continued a considerable time, if even three weeks or a month, it will be the better.

This was given, among other recipes by Kunckel, but appears to have been neglected till it was revived with great success in the Birmingham manufactures, where it was not only the ground of snuff-boxes, dressing-boxes, and other such like lesser pieces, but of those beautiful tea-waiters, which have been so justly esteemed and admired in several parts of Europe where they have been sent. This ground may be decorated with painting and gilding, in the same manner as any other varnished surface, which had best be done after the ground has been duly hardened by the hot stove ; but it is well to give a second annealing with a more gentle heat after it is finished.

Of painting japan work.—Japan work ought properly to be painted with colours in varnish. But in order for the greater dispatch, and in some very nice works in small, for the freer use of the pencil,

the colours are now most frequently tempered in oil; which should previously have a fourth part of its weight of gum animi dissolved in it; or in default of that, of the gums sandrac or mastic, as I have likewise before intimated. When the oil is thus used, it should be well diluted with spirit of turpentine, that the colours may be laid more evenly and thin: by which means, fewer of the polishing or upper coats of varnish become necessary.

In some instances, water colours, as I before mentioned, are laid on grounds of gold, in the manner of other paintings; and are best, when so used, in their proper appearance, without any varnish over them. They are also sometimes so managed, as to have the effect of embossed work. The colours employed in this way, for painting, are (as I before intimated) best prepared by means of isinglass size, corrected with honey, or sugar-candy. The body on which the embossed work is raised, need not, however, be tinged with the exterior colour, but may be best formed of very strong gum water, thickened to a proper consistence by bole armoniac and whiting in equal parts; which being laid on in the proper figure, and repaired when dry, may be then painted with the proper colours tempered in the isinglass size, or in the general manner with shell-lac varnish.

Of varnishing japan work.—The last, and finishing part of jappanning, lies in the laying on and polishing the outer coats of varnish; which are necessary, as well in the pieces that have only one simple ground of colour, as with those that are painted. This is, in general, best done with common seed-lac varnish; except in the instances, and on those

those occasions, where I have already shewn other methods to be more expedient. The same reasons, which decide as to the fitness or impropriety of the varnishes, with respect to the colours of the ground, hold equally well with regard to those of the painting. For where brightness is the most material point, and a tinge of yellow will injure it, seed-lac must give way to the whiter gums. But where hardness, and a greater tenacity, are most essential, it must be adhered to; and where both are so necessary, that it is proper one should give way to the other, in a certain degree reciprocally, a mixt varnish must be adopted.

This mixed varnish, as I before observed, should be made of the picked seed-lac. The common seed-lac varnish, which is the most useful preparation of the kind hitherto invented, may be thus made:

“ Take of seed-lac three ounces, and put it into water to free it from the sticks and filth that frequently are intermixed with it; and which must be done by stirring it about, and then pouring off the water and adding fresh quantities, in order to repeat the operations till it be free from all impurities, as it very effectually may be by this means. Dry it then and powder it grossly; put it, with a pint of rectified spirit of wine, into a bottle, of which it will not fill above two thirds. Shake the mixture well together, and place the bottle in a gentle heat, till the seed appears to be dissolved; the shaking being in the mean time repeated as often as may be convenient; and then pour off all which can be obtained clear by that method, and strain the remainder through a coarse cloth. The varnish thus prepared must be kept for use in a bottle well stoppt.”

When

When the spirit of wine is very strong, it will dissolve a greater proportion of the seed-lac; but this will saturate the common, which is seldom of a strength sufficient for making varnishes in perfection. As the chilling, which is the most inconvenient accident attending those of this kind, is prevented, or produced more frequently, according to the strength of the spirit, I will take this opportunity of shewing a method by which weaker rectified spirits may, with great ease, at any time, be freed from the phlegm, and rendered of the first degree of strength.

“ Take a pint of the common rectified spirit of
 “ wine; and put it into a bottle, of which it will not
 “ fill above three parts. Add to it half an ounce of
 “ pearl-ashes, salt of tartar, or any other alkaline
 “ salt, heated red hot, and powdered, as well as it
 “ can be without much loss of its heat. Shake the
 “ mixture frequently for the space of half an hour;
 “ before which time, a great part of the phlegm will
 “ be separated from the spirit; and will appear, to-
 “ gether with the undissolved part of the salts, in the
 “ bottom of the bottle. Let the spirit then be pour-
 “ ed off, or freed from the phlegm and salts by
 “ means of a tritorium, or separating funnel; and let
 “ half an ounce of the pearl-ashes, heated and pow-
 “ dered as before, be added to it, and the same treat-
 “ ment repeated. This may be done a third time, if
 “ the quantity of phlegm separated by the addition of
 “ the pearl-ashes appear considerable. An ounce of
 “ alum reduced to powder and made hot, but not
 “ burnt, must then be put into the spirit, and suffered
 “ to remain some hours; the bottle being frequently
 “ shaken. After which, the spirit being poured off,
 “ it will be fit for use.

The addition of the the alum is necessary, to neutralize the remains of the alkaline salts, or pearl-ashes; which would otherwise greatly deprave the spirit, with respect to varnishes and lacquers, where vegetable colours are concerned, and must consequently render another distillation necessary.

The manner of using the seed-lac, or white varnishes, is the same; except with regard to the substance used in polishing, which, where a pure white, or great clearness of other colours, is in question, should be itself white; whereas the browner sorts of polishing dust, as being cheaper, and doing their business with greater dispatch, may be used in other cases. The pieces, or work, to be varnished should be placed near a fire, or in a room where there is a stove, and made perfectly dry; and then the varnish may be rubbed over them by the proper brushes made for that purpose, beginning in the middle, and passing the brush to one end; and then, with another stroke from the middle, passing it to the other. But no part should be crossed or twice passed over, in forming one coat, where it can possibly be avoided. When one coat is dry, another must be laid over it; and this must be continued at least five or six times, or more, if on trial, there be not a sufficient thickness of varnish to bear the polish, without laying bare the painting, or the ground colour underneath.

When a sufficient number of coats is thus laid on, the work is fit to be polished; which must be done, in common cases, by rubbing it with a rag dipped in tripoli (commonly called rotten stone) finely powdered. But towards the end of the rubbing, a little oil of any kind should be used along with the powder; and when the work appears sufficiently bright and glossy, it should be well rubbed with the oil
alone,

alone, to clean it from the powder, and give it a still brighter lustre.

In the case of white grounds, instead of the tripoli, fine putty or whiting must be used; both which should be washed over, to prevent the danger of damaging the work from any sand or other gritty matter, that may happen to be commixt with them.

It is a great improvement of all kinds of japan work, to harden the varnish by means of heat; which, in every degree that can be applied short of what would burn or calcine the matter, tends to give it a more firm and strong texture. Where metals form the body, therefore, a very hot stove may be used, and the pieces of work may be continued in it a considerable time; especially if the heat be gradually increased. But where wood is in question, heat must be sparingly used, as it would otherwise warp or shrink the body, so as to injure the general figure.

Of gilding japan work. —The various methods of gilding, which are applicable to the ornamenting japan work, being exceedingly prolix and uninteresting, it is needless to repeat them here. I shall, therefore, only observe, that in gilding with gold size (which is almost the only method now practised in japan work) where it is desired to have the gold not shine, or approach in the least towards the burnishing state, the size should be used either with oil of turpentine only, or with a very little fat oil. But where a greater lustre, and appearance of polish, are wanting, without the trouble of burnishing, and the preparation necessary for it, fat oil alone, or mixed with a little gold size, should be used; and the same proportionable effect will be produced from a mean proportion of them.

Of

Of LACQUERING.

LACQUERING is the laying either coloured or transparent varnishes on metals, in order to produce the appearance of a different colour in the metal, or to preserve it from rust and the injuries of the weather.

Lacquering is therefore much of the same nature with japanning, both with regard to the principles and practice; except that no opaque colours, but transparent tinges alone, are to be employed.

The occasions on which lacquering is now in general used are three; where brass is to be made to have the appearance of being gilt; where tin is wanted to have the resemblance of yellow metals; and where brass or copper locks, nails, or other such matters, are to be defended from the corrosion of the air or moisture. There was, indeed, formerly another very frequent application of lacquering, which was colouring frames of pictures, &c. previously silvered, in order to give them the effect of gilding; but this is now mostly disused. These various intentions of lacquering require different compositions, for the effectuating each kind; and as there is a multiplicity of ingredients which may be conducive to each purpose, a proportionable number of recipes have been devised, and introduced into practice; especially for the lacquering brass work to imitate gilding; which is a considerable object in this kind of art; and has been improved to the greatest degree of perfection. I shall, however, only give one or two recipes for each, as they are all which are necessary; the others being either made too complex

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plex by ingredients not essential to the intention, or too costly by the use of such as are expensive; or inferior in goodness, from the improper choice or proportion of the component substances.

The principal body or matter of all good lacquers used at present is seed-lac; but, for coarser uses, resin, or turpentine, is added, in order to make the lacquer cheaper than if the seed-lac, which is a much dearer article, be used alone. Spirit of wine is also consequently the fluid or menstruum of which lacquers is formed; as the ethereal oils will not dissolve the seed-lac, and it is proper that the spirit should be highly rectified for this purpose. As it is seldom practicable, nevertheless, to procure such spirits from the shops, it will be found very advantageous to use the method above given for dephlegmating it by alkaline salts; but the use of the alum, directed in that process, must not be forgotten on this occasion; as the effect of the alkaline salt would otherwise be the turning the metal of a purplish instead of a golden colour, by laying on the lacquer.

The following are excellent compositions for brass work which is to resemble gilding:

“ Take of turmeric ground, as it may be had at
 “ the dry-salters, one ounce, and of saffron and Span-
 “ ish annatto each two drams. Put them into a
 “ proper bottle, with a pint of highly rectified spirit
 “ of wine; and place them in a moderate heat, if
 “ convenient, often shaking them for several days.
 “ A very strong yellow tincture will then be obtain-
 “ ed, which must be strained off from the dregs
 “ through a coarse linen cloth; and then, being put
 “ back into the bottle, three ounces of good seed-
 “ lac,

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“lac, powdered grossly, must be added, and the mixture placed again in a moderate heat, and shaken, till the seed-lac be dissolved; or at least such part of it as may. The lacquer must then be strained as before, and will be fit for use; but must be kept in a bottle carefully stopped.”

Where it is desired to have the lacquer warmer or redder than this composition may prove, the proportion of the annatto must be increased; and where it is wanted cooler, or nearer a true yellow, it must be diminished.

The above, properly managed, is an extremely good lacquer, and of moderate price; but the following, which is cheaper, and may be made where the Spanish annatto cannot be procured good, is not greatly inferior to it:

“Take of turmeric root ground one ounce, of the best dragon's blood half a dram. Put them to a pint of spirit of wine, and proceed as with the above.”

By diminishing the proportion of the dragon's blood, the varnish may be rendered of a redder, or truer yellow cast.

Saffron is sometimes used to form the body of colour in this kind of lacquer, instead of the turmeric; but though it makes a warmer yellow, yet the dearth of it, and the advantage which turmeric has in forming a much stronger tinge in spirit of wine, not only than the saffron, but than any other vegetable matter hitherto known, gives it the preference. Though being a true yellow, and consequently not sufficiently warm to overcome the greenish cast of brass, it requires the addition of some orange-coloured tinge to make a perfect lacquer for this purpose.

Aloes and gamboge are also sometimes used in lacquers, for brass; but the aloes is not necessary where turmeric or saffron are used; and the gamboge, though a very strong milky yellow in water, affords only a very weak tinge in spirit of wine.

The varnish for tin may be made as follows:—
 “Take of turmeric root one ounce, of dragon’s
 “blood two drams, and of spirit of wine one pint.
 “Proceed as in the former.”

This may, like the former, have the red or yellow rendered more prevalent, by the increasing or diminishing the proportion of the dragon’s blood. Where a coarser, or cheaper kind is wanted, the quantity of seed-lac may be abated; and the deficiency thence arising supplied by the same proportion of resin.

The lacquer for locks, nails, &c. where little or no colour is desired, may either be seed-lac varnish alone, as prepared above, or with a little dragon’s blood; or a compound varnish of equal parts of seed-lac and resin, with or without the dragon’s blood.

The manner of laying on the lacquer is as follows:

First let the pieces of work to be lacquered be made thoroughly clean; which, if they be new founded, must be done by means of aquafortis. Being ready, they must be heated by a small charcoal fire, in a proper vessel, or any way that may be most convenient; the degree must not be greater than will admit of their being taken hold of without burning the hand. The lacquer must then be laid on by a proper brush in the manner of other varnishes; and the pieces immediately set again in the same warm situation. After the lacquer is thoroughly dry and firm the same operation must be renewed again for four

or

or five times, or till the work appear of the colour and brightness intended. For very fine work, some use a less proportion of seed-lac, which occasions the lacquer to lie even on the metal; but, in this case, a greater number of coats are required, which multiplies the proportion of labour; though, where the price of the work will allow for such additional trouble, it will be the more perfect for it.

The lacquering tin may be performed in the same manner, as is here directed for brass, but being for coarser purposes, less nicety is observed; and fewer coats (or perhaps one only) are made to suffice, as the lacquer is compounded very red, that the tinge may have the stronger effect.

Locks, nails, &c. where lacquer is only used in a defensive view, to keep them from corroding, and not for the improvement of the colour, may be treated in the same manner; but one or two coats are generally thought sufficient. Though, where any regard is had to the wear, the coats of lacquer or varnish should always be of a due thickness, when they are to be exposed to the air; otherwise, the first moist weather makes them chill, and look grey and milky, in such a manner, that they are rather injurious than beneficial to the work they are laid upon.

The lacquering picture frames, &c. where the ground is leaf silver, may be performed in the same manner as hereafter directed in the case of gilding leather; the circumstances being nearly the same, except with relation to the texture of the subject; to suit which the different manner of treatment may be easily adapted. But the lacquer, as was before observed, may be the same.

Of STAINING.

Of staining wood yellow.

TAKE any white wood, and brush it over several times with the tincture of turmeric root, made by putting an ounce of the turmeric ground to powder, to a pint of spirit; and, after they have stood some days, straining off the tincture. If the yellow colour be desired to have a redder cast, a little dragon's blood must be added, in the proportion that will produce the tint required.

A cheaper, but least strong and bright yellow, may be given to wood, by rubbing it over several times with the tincture of the French berries, prepared as in p. 71. and made boiling hot. After the wood is again dry, it should be brushed over with a weak alum-water, used cold.

Lesser pieces of wood, instead of being brushed over with them, may be soaked in the decoctions or tinctures.

Wood may be also stained yellow by means of aquafortis; which will sometimes produce a very beautiful yellow colour; but at other times a browner. The wood should be warm, when the aquafortis is laid on; and be held to the fire immediately afterwards; and care must be taken, that either the aquafortis be not too strong, or that it be sparingly used; otherwise a brown, sometimes even a blackish colour may be the result.

In order to render any of these stains more beautiful and durable, the wood should be brushed after it is coloured, and then varnished by the seed-lac varnish; or, when desired to be very strong, and to take
a high

a high polish, with three or four coats of shell-lac varnish.

Of staining wood red.—For a bright red stain for wood, make a strong infusion of brasil in stale urine, or water impregnated with pearl ashes, in the proportion of an ounce to a gallon; to a gallon of either of which, the proportion of brasil wood must be a pound, which being put to them, they must stand together two or three days, often stirring the mixture. With this infusion strained, and made boiling hot, brush over the wood to be stained, till it appears strongly coloured; then, while yet wet, brush it over with alum water, made in the proportion of two ounces of alum to a quart of water.

For a less bright red, dissolve an ounce of dragon's blood in a pint of spirit of wine, and brush over the wood with the tincture, till the stain appears to be as strong as is desired. But this is, in fact, rather lacquering than staining.

For a pink or rose red, add to a gallon of the above infusion of brasil wood two additional ounces of the pearl ashes, and use it as was before directed; but it is necessary, in this case, to brush the wood over often with alum water. By increasing the proportion of pearl ashes, the red may be rendered yet paler; but it is proper, when more than this quantity is added, to make the alum water stronger.

These reds, when it is necessary, may be varnished as the yellows.

Of staining wood blue.—Wood may be stained blue, by means either of copper or indigo; but the first will afford a brighter colour, and is more generally practicable than the latter; because the indigo can be used only in that state to which it is brought

brought by the manner of preparation used by the dyers, of whom indeed it must be had, as it cannot be properly so prepared but in large quantities, and with a particular apparatus. The method of staining blue with the copper is as follows:

“Take a solution of copper, made according to the directions in p. 63; and brush it, while hot, several times over the wood. Then make a solution of pearl ashes, in the proportion of two ounces to a pint of water, and brush it hot over the wood stained with the solution of copper, till it be of a perfectly blue colour.”

Wood stained green as above by verdigrise, may likewise be made blue, by using the solution of the pearl ashes in the same manner.

When indigo is used for staining wood blue, it must be managed thus:

“Take indigo prepared with soap lees, as when used by the dyers, and brush the wood with it boiling hot. Prepare then a solution of white tartar, or cream of tartar, which is to be made, by boiling three ounces of the tartar, or cream, in a quart of water; and with this solution, used copiously, brush over the wood before the moisture of the tincture of indigo be quite dried out of it.”

These blues may be rushed and varnished as the reds, where there is occasion.

Of staining wood of mahogany colour.—Mahogany colour is the most useful of any stain for wood (especially since fincerring with different colours is out of fashion) as it is much practised at present for chairs and other furniture, made in imitation of mahogany; which, when well managed, may be brought to have a very near resemblance.

This

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This stain may be of different hues, as the natural wood varies greatly, being of all the intermediate tints betwixt the red brown and purple brown, according to the age, or sometimes the original nature of different pieces.

For the light red brown, use a decoction of madder and fustic wood, ground in water; the proportion may be half a pound of madder, and a quarter of a pound of fustic, to a gallon; or in default of fustic an ounce of the yellow berries may be used. This must be brushed over the wood to be stained, while boiling hot, till the due colour be obtained; and, if the wood be kindly grained, it will have greatly the appearance of new mahogany.

The same effect nearly may be produced by the tincture of dragon's blood and turmeric root, in spirit of wine; by increasing or diminishing the proportion of each of which ingredients, the brown stain may be varied to a more red or yellow cast at pleasure. This succeeds better upon wood, which has already some tinge of brown, than upon whiter.

For the dark mahogany, take the infusion of madder made as above, except the exchanging the fustic for two ounces of logwood; and when the wood to be stained has been several times brushed over, and is again dry, it must be slightly brushed over with water in which pearl ashes have been dissolved, in the proportion of about a quarter of an ounce to a quart.

Any stains of the intermediate colours may be made, by mixing these ingredients, or varying the proportion of them.

Where these stains are used for better kind of work, the wood should be afterwards varnished with three or four coats of seed-lac varnish; but for

A a

coarse

coarse work, the varnish of resin and seed-lac may be employed, or they may be only well rubbed over with drying oil.

Of staining wood green.—Dissolve verdigrise in vinegar, or chrystals of verdigrise in water; and with the hot solution, brush over the wood till it be duly stained. This may be rushed and varnished as above.

Of staining wood purple.—Brush the wood to be stained several times with a strong decoction of logwood and brasil, made in the proportion of one pound of the logwood, and a quarter of a pound of the brasil, to a gallon of water, and boiled for an hour or more. When the wood has been brushed over till there be a sufficient body of colour, let it dry, and then be slightly passed over by a solution of one dram of pearl ashes in a quart of water. This solution must be carefully used, as it will gradually change the colour from a brown red, which it will be originally found to be, to a dark blue purple; and therefore its effect must be restrained to the due point for producing the colour desired. This may be varnished as the rest.

Of staining wood black.—Brush the wood several times with the hot decoction of logwood made as above, but without the brasil. Then, having prepared an infusion of galls, by putting a quarter of a pound of powdered galls to two quarts of water, and setting them in the sun-shine, or any other gentle heat, for three or four days, brush the wood three or four times over with it; and then pass over it again, while yet wet, with a solution of green vitriol in water, in the proportion of two ounces to a quart.

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The above is the cheapest method ; but a very fine black may be produced, by brushing the wood several times over with a solution of copper in aquafortis ; and afterwards with the decoction of logwood, which must be repeated till the colour be of sufficient force ; and the greenness produced by the solution of the copper, wholly overcome. These blacks may be varnished as the other colours.

Where the stains are desired to be very strong, as in the case of wood intended to be used for fineering, it is in general necessary they should be soaked, and not brushed ; to render which the more practicable, the wood may be previously slit, or sawed into pieces of a proper thickness for inlaying.

It is to be understood also, that when the wood is above ordered to be brushed several times over with the tinging substances, it should be suffered to dry betwixt each time.

Of staining ivory, bone, or horn, yellow.—Boil them first in a solution of alum, in the proportion of one pound to two quarts of water ; and then prepare a tincture of the French berries, by boiling half a pound of the berries, pounded, in a gallon of water, with a quarter of a pound of pearl ashes. After this tincture has boiled about an hour, put the ivory, &c. previously boiled in the alum water, into it, and let them remain there half an hour.

If turmeric root be used, instead of the French berries, a brighter yellow may be obtained ; but the ivory, &c. must in that case be again dipt in alum water, after it is taken out of the tincture, otherwise an orange colour, not a yellow, will be produced, from the effect of the pearl ashes on the turmeric.

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Of staining ivory, bone, and horn, green.—They must be boiled in a solution of verdigrise in vinegar, or of copper in aquafortis, prepared as above directed (a vessel of glass or earthenware being employed for this purpose) till they be of the colour desired.

Of staining ivory, bone, and horn, red.—Take strong lime water, prepared as for other purposes, and the raspings of brasil wood, in the proportion of half a pound to a gallon. Let them boil for an hour, and then put in the ivory, &c. prepared by boiling in alum water in the manner above directed for the yellow; and continue it there till it be sufficiently coloured. If it be too crimson, or verge toward the purple, it may be rendered more scarlet, by dipping again in the alum water.

Of staining ivory, bone, and horn, blue.—Stain the ivory, &c. first green, according to the manner above directed; and then dip it in a solution of pearl ashes made strong and boiling hot; but it must not be continued longer, nor dipt oftener, than is necessary to convert the green to blue.

The ivory, &c. may otherwise be boiled in the tincture of indigo, prepared as by the dyers, and afterwards in the solution of tartar, made as is directed for the staining wood.

Of staining ivory, bone, and horn, purple.—Treat them in the same manner as was directed for red, except that logwood must be substituted in the place of brasil wood, and the use of the alum water must be omitted wholly.

If a redder purple be wanted, a mixture of the logwood and brasil must be employed, instead of the logwood alone. The proportion may be equal parts;
or

or any less proportion of the brasil, according to the colour desired.

Of staining horn to imitate tortoise-shell.—The horn to be stained must be first pressed into proper plates, or scales, or other flat form. The following mixture must then be prepared :

“ Take of quick lime two parts, and of litharge
“ one, and temper them to the consistence of a soft
“ paste with soap lye.”

Put this paste over all the parts of the horn, except such as are proper to be left transparent, in order to the greater resemblance of the tortoise-shell. The horn must then remain thus covered with the paste till it be thoroughly dry ; when the paste being brushed off, the horn will be found partly opaque, and partly transparent, in the manner of tortoise-shell ; and when put over a foil, of the kind of latten called assidue, will be scarcely distinguishable from it. It requires some degree of fancy and judgment, to dispose of the paste in such a manner, as to form a variety of transparent parts of different magnitude and figure, to look like the effect of nature ; and it will be an improvement to add semi-transparent parts. This may be done by mixing whiting with some of the paste to weaken its operation in particular places, by which spots of a reddish brown will be produced ; that if properly interspersed, especially on the edges of the dark parts, will greatly increase as well the beauty of the work, as its similitude with the real tortoise-shell.

To stain ivory, bone, and horn, black.—Proceed in the same manner as is above directed for wood.

Of staining paper, or parchment, yellow.—Paper may be stained yellow by the tincture of French berries,

berries, prepared as in p. 67. but a much more beautiful colour may be obtained by using the tincture of turmeric formed by infusing an ounce or more of the root, powdered, in a pint of spirit of wine. This may be made to give any teint of yellow, from the lightest straw to the full colour, called French yellow; and will be equal in brightness even to the best dyed silks. If yellow be wanted of a warmer or redder cast, annatto, or dragon's blood, must be added to the tincture.

The best manner of using these, and the following tinctures, is to spread them even on the paper or parchment, by means of a broad brush, in the manner of varnishing.

Of staining paper, or parchment, red.—Paper or parchment may be stained red, by treating it in the same manner as is directed for wood, p. 182, or by red ink. It may also be stained of a scarlet hue by the tincture of dragon's blood in spirit of wine; but this will not be bright.

A very fine crimson stain may be given to paper, by a tincture of Indian lake; which may be, by infusing the lake some days in spirit of wine; and then pouring off the tincture from the dregs.

Of staining paper, or parchment, green.—Paper, or parchment, may be stained green, by the solution of verdigrise in vinegar; or by the chrystals of verdigrise dissolved in water. As also by the solution of copper in aquafortis made by adding filings of copper gradually to the aquafortis till no ebullition ensues; or spirit of salt may be used in the place of the aquafortis.

Of staining paper, or parchment, blue.—A blue colour may be given to paper, or parchment, by staining

staining it green by any of the abovementioned methods; and treating it afterwards as is directed for staining wood blue, by the same means; or by indigo in the manner there explained likewise.

Of staining paper, or parchment, orange.—Stain the paper, or parchment, first of a full yellow, by means of the tincture of turmeric, as above directed. Then brush it over with a solution of fixt alkaline salt, made by dissolving half an ounce of pearl ashes, or salt of tartar, in a quart of water, and filtering the solution.

Of staining paper, or parchment, purple.---Paper, or parchment, may be stained purple by archal; or by the tincture of logwood, according to the method above directed for staining wood. The juice of ripe privet berries expressed will likewise give a purple dye to paper or parchment.

Of staining alabaster, marble, and other stones, of various colours.---Alabaster, marble, and other stones may be stained of a yellow, red, green, blue, purple, black, or any of the compound colours, by the means given for staining wood. But it is better, when a strong tinge is wanted, to pour the tincture, if made in water, boiling hot on the alabaster, &c. spreading it equally on every part, than to brush it over only; though that may be sufficient where a slighter dye will suffice. When tinctures in spirit of wine are used, they must not be heated; as the spirit would evaporate, and leave the tinging gums in an undissolved state.

Where stones are not perfectly white, but partake of brownness, or greyness, the colour produced by the tinges will be proportionably wanting in brightness. Because the natural colour of the stone is not
hid

hid or covered by these tinges, but combines with them; and, for the same reason, if the stones be of any of the pure colours, the result will be a compound of such colour and that of the tinge.



Of ETCHING *and* ENGRAVING.

ETCHING is a method of working on copper, wherein the lines or strokes, instead of being cut with a graver, are eaten with aquafortis.

This art being executed with greater ease and freedom than engraving, represents curious subjects better, and more agreeable to nature, as landshapes, ruins, and small, faint, or remote objects, buildings, &c.

The principal materials for this art are the plate, hard and soft gound, (the first for winter, and the other for summer) a dabber, turpentine varnish, lamp black, soft wax, and aquafortis.

The tools are, an oil rubber, a burnisher, a scraper, a hand vice, etching boards, etching needles, an oil stone, and a parallel ruler.

Directions for laying the ground.—Having provided yourself with a plate of the size of the print, or drawing you intend to copy, rub it well with an oil rubber, made of swan-skin flannel, till all the marks of the charcoal used in polishing it, entirely disappear; then, wiping off the dirty oil with a linen rag, dip your finger in some clean oil, and touch it over every part of the plate; after which, with your burnisher polish the plate, till you can see your face in it; and in case any sand holes, or flaws appear,

pear, the scraper will assist you in taking them out. The marks left by the scraper are to be taken out with the burnishers, till nothing appear. Having fixed your hand-vice at one end of the plate, with a rag and whiting clear the plate carefully from grease; then heat it over a charcoal fire, or lighted paper, till it will melt the ground, which is to be laid on thinly, and dabbed all over with the dabber, till it is perfectly smooth and even; then warm the plate again, and, holding it up with the ground downwards, smoke it all over with a large candle, taking care that the snuff of it do not touch the ground, and waving the candle continually over every part, so that the ground may not be burnt by heating it more in one place than another. If the plate be large, you may bind four penny candles together.

Directions for tracing.---The first thing to be done (while the plate is cooling, and the ground laid on) is to rub the back of your print or drawing all over with a bit of rag or cotton, dipt in the scrapings of red chalk, and shake off the loose dust, or wipe it off gently with a clean rag. Place the red side upon the plate, making it fast at each corner with a little bit of soft wax. Lay your etching board under your hand, to prevent bruising the ground; then, with a blunt etching needle, trace lightly the out-lines and breadths of the shadows, till the marks of them appear upon the ground, which you must take care not to penetrate by tracing too hard.

As great nicety is required in this part of your work, it will be necessary now and then to lift up one corner of your original, and examine whether every part be traced before you take it off, as it will be extremely difficult to lay it down again in its former position,

Directions for etching.—Having carefully traced your original, take it off, and lay a silk or linen handkerchief next the plate, and over that your etching board; then proceed to the etching; for which observe the following directions, which are adapted to every particular branch; as landskapes, shipping, portraits, history, architecture, &c.

Distances in landskapes, or the faint parts of any other picture, are the first to be done; and these are to be worked closer, and with a sharper pointed needle; the darker parts must be etched wider, and with a blunter needle; but, to prevent mistakes, the needles may be marked according to their different degrees, and the uses for which they are intended. As for the very faintest parts of all, they are to be left for the graver, or dry needle; of which hereafter.

In building, and all architecture in general, use a parallel ruler, till frequent practice enables you to do them well enough without.

The needles may, when necessary, be whetted upon your oil-stone, keeping them turning in your hand, so as to whet them equally all round. The oil-stone will be farther useful in whetting the scraper, which is to be rubbed flat upon the stone, and with a steady hand, keeping oil constantly upon the stone.

Of biting, or eating in the work with aquafortis.—First examine your work carefully, to see that nothing be omitted; and if any scratches appear upon the ground, or mistakes be committed in the etching, they are to be stopped out, which is done by covering them with a mixture of lamp black and varnish, laid on thinly with a hair pencil, which, when dry, will resist the aquafortis. But it will be best to stop out these, as they occur to you in the course of your work

work, for by this means they will be less liable to escape your notice; and when the varnish is dry, you may etch over it again, if required.

The next thing is, to inclose the work with a rim, or border of soft green, or other coloured wax, about half an inch high, bending the wax in the form of a spout at one corner, to pour off the aquafortis; and that it may not run out at any other part, take care to lay your wax so close to the plate, that no vacancies be left.

Your aquafortis must be single, and if too strong, as will be seen in the biting, take it off and mix it with a little water, shaking them together in a bottle; and when, by often using, it becomes too weak, it may be strengthened by mixing it in a bottle with a little double aquafortis. The bottle which contains the aquafortis should have a large mouth, and a glass stopple.

Let the aquafortis lie on the plate a short time, wiping off the bubbles as they rise, with a feather, which may remain upon the plate while it is biting; after which, take it off, and wash the plate with water; then let it dry, and by scraping off part of the ground from the faintest part of the work, try if it be bit enough; and if not, stop out the part you have tried with the lamp black and varnish; and when that is dry, pour on the aquafortis again.

When the faint parts of your work are bit enough, stop them out, and proceed to bite the stronger parts, stopping them out as occasion requires, till the whole work is sufficiently bit; then warm the plate, and take off the soft wax: after which, heat the plate till the ground melts, pour on a little oil, and wipe the whole off with a rag. When the ground is taken

off, rub the work well with the oil-rubber, and wipe the plate clean; then proceed to finish it with the graver, according to the following directions:

Of engraving.—The tools necessary for engraving are, the oil-rubber, burnisher, scraper, oil-stones, needles, and ruler, already mentioned to be used in etching; also gravers, compasses, and a sand bag.

Gravers are of two sorts, square and lozenge: three of each sort should be provided. The first is used in cutting the broader strokes, the other for the fainter and more delicate. No graver should exceed the length of five inches and a half, the handle included, excepting for straight lines.

The sand bag, or cushion, is used to lay the plate on, for the conveniency of turning it about. The oil-stone, must be of the Turkey sort.

Of whetting and tempering the graver.—As great pains are required to whet the graver nicely, particularly the belly of it, care must be taken to lay the two angles of the graver, which are to be held next the plate, flat upon the stone, and rub them steadily till they are polished like a mirror, and till the belly rises gradually above the plate, so as that, when you lay the graver flat upon it, you may just perceive the light under the point; otherwise it will dig into the copper, and it will be impossible to keep a point, or execute the work with freedom. In order to this, keep your right arm close to your side, and place the fore-finger of your left hand upon that part of the graver which lies uppermost on the stone. When this is done, in order to whet the face, place the flat part of the handle in the hollow of your hand, with the belly of the graver upwards, upon a moderate slope, and rub the extremity, or face upon the stone,
till

till it has an exceeding sharp point, which you may try upon your thumb nail. The oil-stone, while in use, must never be kept without oil.

When the graver is too hard, as is usually the case when first bought, and may be known by the frequent breaking of the point, the method of tempering the steel is as follows:

Heat a poker red hot, and hold a graver upon it within half an inch of the point, waving it to and fro till the steel changes to a light straw colour; then put the point into oil to cool; or, hold the graver close to the flame of a candle, till it be of the same colour, and cool it in the tallow; but be careful either way not to hold it too long, for then it will be too soft; and in this case the point, which will then turn blue, must be broken off, and whetted afresh, and tempered again, if required. But be not too hasty in tempering; for sometimes a little whetting will bring it to a good condition.

Of holding the graver.—Cut off that part of the handle which is upon the same line with the belly, or sharp edge of the graver, making that side flat, that it may be no obstruction.

Hold the handle in the hollow of your hand; and extending your fore-finger towards the point, let it rest upon the back of the graver, that you may guide it flat, and parallel with the plate.

Take care that your fingers do not interpose between the plate and the graver; for they will prevent you from carrying the graver level with the plate, and from cutting your strokes so clean as they ought to be.

Directions for engraving.—Let the table or board you work at be firm and steady; upon which place
your

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your sand bag with the plate upon it; and, holding the graver as above directed, proceed to business in the following manner:

For straight strokes, hold your plate firm upon the sand bag with your left hand, moving your right hand forwards; leaning lighter where the stroke should be fine, and harder where you would have it broader.

For circular or crooked strokes, hold the graver fixedfast, moving your hand or the plate, as you see convenient.

Learn to carry your hand with such a slight, that you may end your stroke as finely as you began it; and if you have occasion to make one part deeper or blacker than another, do it by degrees; and that you may do it with greater exactness, take care that your strokes be not too close, nor too wide.

In the course of your work, scrape off the barb or roughness which arises, with the belly of your graver; but be careful in doing this, not to scratch the plate: and that you may see your work properly as you go on, rub it with the oil rubber, and wipe the plate clean, which will take off the glare of the copper, and shew what you have done to the best advantage.

Any mistakes or scratches in the plate may be rubbed out with the burnisher, and the part levelled with the scraper, polishing it again afterwards lightly with the burnisher.

Having thus attained the use of the graver, according to the foregoing rules, you will be able to finish the piece you had etched, by graving up the several parts to the colour of the original; beginning, as in the etching, with the fainter parts, and advancing gradually with the stronger, till the whole is completed.

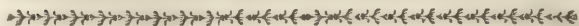
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The dry needle (so called because not used till the ground is taken off the plate) is principally employed in the extreme light parts of water, sky, drapery, architecture, &c.

For your first practice, copy such prints as are openly shaded, the more finished ones being too difficult, till you have gained farther experience.

Great choice of prints of every kind, fit for young beginners, may be had where this book is published.

N. B. To prevent any obstruction from too great a degree of light; we should recommend the use of a sash, made of transparent or fan paper, pasted on a frame, and placed sloping, at a convenient distance between your work and the light. This will not only preserve the sight, but, when the sun shines, cannot possibly be dispensed with.



Of MEZZOTINTO-SCRAPING.

THIS art, which is of late date, is recommended to the practice of the ingenious reader, for the amazing ease with which it is executed, especially by those who have any notion of drawing.

Mezzotinto prints are those which have no etching or strokes of the graver, but whose lights and shades are blended together, and appear like a drawing of Indian ink.

The tools used in this art are, the copper plate, oil-stone, grounding-tools, scraper, burnisher, and needles.

Directions for laying the mezzotinto ground.—
Mark off upon the bottom of the plate the distance
you

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you intend to leave for the writing, coat of arms, &c. then, laying your plate with a piece of swanskin flannel under it, upon your table, hold the grounding-tool in your hand perpendicularly, lean upon it moderately hard, continually rocking your hand in a right line from end to end, till you have wholly covered the plate in one direction; next, cross the strokes from side to side, afterwards from corner to corner, working the tool each time all over the plate, in every direction, almost like the points of a compass; taking all possible care not to let the tool cut (in one direction) twice in a place. This done, the plate will be full, or, in other words, all over rough alike, and would, if it were printed, appear completely black.

Having laid the ground, take the scrapings of black chalk, and, with a piece of rag, rub it over the plate; or you may, with two or three candles, smoke it as before directed for etching.

Now, take your print, or drawing, and having rubbed the back with red chalk dust, mixed with white lake, proceed to trace it, as directed in p. 193.

Directions for whetting the grounding-tool.—If a tooth of the tool should break, it may be perceived in the working by a particular streak or gap, which will appear in the ground in a straight line; in which case the tool must be whetted on the back, holding it sloping, and in a circular manner, like the bottom of the tool.

Directions for scraping the picture.—Take a blunt needle and mark the out-lines only, then, with a scraper, scrape off the lights in every part of the plate, as clean and smooth as possible, in proportion to the strength of the lights in your picture, taking care not

to hurt your out-lines; and that you may the better see what you do, with the thumb and fore-finger of the left hand, hold a piece of transparent paper, sloping, just over your right hand, and you will soon be a judge of the different teints of the work you are doing, scraping off more or less of the ground, as the different strengths of light and teints require.

The use of the burnisher is to soften, or rub down, the extremely light parts, after the scraper is done with, such as the tip of the nose, forehead, linen, &c. which might otherwise, when proved, appear rather misty than clear.

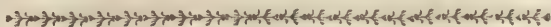
Another method, used by mezzotinto-scrapers, is to etch the out-lines of the original, as also of the folds in drapery, marking the breadths of the shadows by dots, which, having bit of a proper colour with aquafortis, according to the directions given, p. 195, take off the ground used in etching, and having laid the mezzotinto-ground as in p. 199, proceed to scrape the picture as above. Four or five days before you think the plate will be ready for proving, notice must be given to the rolling-press printer, to wet some French paper, as no other will do for this work, and as that time is necessary for it to lie in wet. When the proof is dry, touch it with white chalk where it should be lighter, and with black chalk where it should be darker; and when the print is re-touched, proceed as before for the lights, and for the shades use a small grounding-tool, as much as you judge necessary to bring it to the proper colour; and when you have done as much as you think expedient, prove it again, and so proceed to prove and touch till it is entirely to your mind.

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When

When the plate tarnishes in the part where you are at work, a little vinegar and salt, kept by you in a vial, will take it off, wiping it dry with a clean rag.

Avoid, as much as possible, over-scraping any part before the first proving, as by this caution the work will appear the more elegant.



Of CASTING.

To prepare clay in such a manner as to be fit to make all manner of moulds to cast gold, silver, and other metals in.

TAKE as much clay as you will, put it into an earthen pot that is glazed, and cover and lute it very close; then put it into a potter's furnace, and let it stand as long as other earthenware. After it is burned and cold, grind the clay upon a colour stone very fine, sift it through a fine hair sieve into clear water, and, after it is settled, pour off the water and grind the clay once more upon the stone, as fine as possible; then wash it again in fair water as before, and set it in the sun, or in a warm place, to dry.

After this burned and washed clay is thoroughly dry, take thereof three pounds, sal-armoniac two pounds, tartar two pounds, and vitriol one pound; mix them together, and put this mixture into one or two pots; pour upon it about seven quarts of clean water, and boil this composition for some time; then take this water, whilst it is warm, and mix your burned clay therewith to such a consistence that you may form it into balls; lay these in a warm place to dry, and, when dry, put them into an earthen-
pot

pot as before, and give them another baking among the earthenware, and, when cold, grind them fine, and that powder will be fit for use.

The clay being thus prepared, take sal-armoniac, put it into a glass, with water, that holds about two quarts, put so much of the sal-armoniac to the water as will dissolve it over a gentle warmth, and let it stand one or two hours closed up; then take your powder of clay, temper it with this water to such a consistence as to form it into balls, and make what moulds you please thereof. When you cast your metal, you must make your mould red hot, and be also very nimble in pouring out your melted metal.

To make moulds of clay to cast brass or other metals therein:—Take good clear clay, such as the pewterers use; take also cloth shaving, or fine short plucked cotton, and fine clear sand, and if the sand is not fine enough, grind it on a colour stone; mix this with the clay to such a consistence as is fit to make or form your moulds thereof. Your clay must not be made soft with water, but with strong beer, and when you cast let your mould be red hot.

If you would have a fine and sharp cast, sift over your clay some fine washed ashes, before you make the impression.

To prepare moulds which need not to be heated, for casting metal in them:—Take fine sand, such as the goldsmiths use; mix it with lamp-black, as much as you think proper; then temper it with rape or linseed oil, fit to make your moulds thereof; whatever you cast in them, comes not only out neat and sharp, but you have no occasion to heat your mould, as is required in other cases: this you must observe, that your sand be very dry, before you temper it with the oil.

The preparation of Mantua earth, for moulds:—Take Mantua earth one part, and one part of charcoal dust of burnt birch, and one part of salt; then mix with it an equal quantity of tartar; boil up the mixture together in a copper pan, and let it seeth three times; with this water, which keeps always good, moisten and temper your earth, so as to form it into balls between your hands, and when you would make your mould, roll your earth with a roller, till it is smooth and pliable, then you may form it into what fashion you please. In this mould you may cast before it is dried; and when you have cast, take off the earth which is dried through the heat of the metal, grind the same again, and temper it as you did at first to use it again.

A particular sort of mould, in which one may cast exceedingly fine:—Take horse muscles, or for want of them oyster shells, let them be calcined in a potter's furnace, then pulverize and temper them with urine; of this make your moulds, and you will cast very fine and sharp.

To impress bas-relievo or medals, in imitation of ivory.—Take of prepared clay one pound, fine plaister of Paris eight ounces, white starch eight ounces, mix these together, and beat up the mixture with the white of six or eight eggs, put to it three ounces of clear gum arabic, stir it well together to a paste, and put so much of the dry mixture to it, till you knead it like dough; then press it into a mould with the palm of your hand, and let it dry in the sun, observing to lay the paste side on a smooth board, and it will be clear and hard, like ivory. You may impress all manner of medals and curiosities, and make them of what colour you please.

To impress medals and other things in bass relieve, on paper:—Take the shavings of superfine white paper, and steep them in fair water for six or eight days, then put them into a clean earthen pot with water, and boil them for two or three hours; this done, take them out of the pot, with as little moisture as possible, and stamp them in a stone mortar very small and fine; then put them into a clean linen bag, and hang that in a vessel with clean water, changing the water once or twice a week: when you have occasion to use it, take as much as you want out of the bag, squeezing the water from it, and put it on the mould, pressing it down gently with a sponge, which will soak up the water, and make the impression more perfect; this being done, set the mould to dry, in the sun, or in a warm room, and when dry, the impression will come off fair and as sharp as if cast in fine plaister of Paris.

To cast vegetables in moulds, peculiarly prepared for silver:—Take fine and clear clay, or spalter, that is dry, and pound it fine in a mortar; then take a copper or iron pan, put in your clay, and give it a brisk fire, and after you have heated it thoroughly, take it off and let it cool; then take one part of this clay, one part alumen plumosum, grind them together and cast the mixture in little teints, which put into a fire to Neal; beat it very fine, and when you would form your plant, take one part of this powder and one part of alumen plumosum, grind them together, and add as much of the clay powder as the mixed matter doth contain, and mix and grind them all together. Then take some potter's clay, to make a coffin round your plant, spread it in what manner you think proper, and after the coffin is dry, anoint the

the inside thereof, as also the plant, with good brandy; dust the before prepared clay and the plant gently, through a fine cambrick, and when you have covered it all over as thick as it will bear, strike the raised coffin a little with your hand or hammer, and the dust will settle closer to the plant and make the silver, cast in, come out the sharper.

After the powder is well settled, and your coffin closed, cover it fine with dead charcoal, and then lay some live ones over them; let the fire gradually descend to the coffin, and heat it by degrees to a strong glue, then let it cool of itself with the fire; take afterward fine clay, fine sand, and some wool shearings; mix this together, beat and knead it well into one another; then temper it with glue, and fill your coffin with it all over the plant, leaving an opening at the stalk for the inlet; then put it again into the fire and make it red hot, and with a pair of bellows, first closed, draw out the ashes from the inlet, and it will be ready for casting.

Then take oil of tartar, which is made of pounded salt of tartar, and scrape a little sal-armoniac into it, to give it the substance of a thin paste, which is a good flux for silver; fling some of this upon your silver when in fusion, and it will cast fine and sharp.

After it is cast, anoint the silver plant with oil of tartar, lay it on live coals, anneal it, and then boil it in tartar, to which you add a little salt, and this will give it a fine bright pearl colour.

A curious method to cast all sorts of things in gold, silver, or other metals:—First pound plaister of Paris, or alabaster, to a fine powder, sift it through a cambrick, or very fine hair sieve, and put it into an iron pan, over a clear coal fire; stir it about until
it

it begins to boil and bubble up like water ; keep it stirring, recruit your fire and continue this until you find it so thick as not to be able to draw it along with your stick ; then pour it into a bowl and let it cool. Take also brick dust finely powdered and sifted.

The miners find sometimes a matter in the iron mines, which they call liver ore ; take this and wash it from the coarser sand, and, when dry, put it into an earthen pot, cover it, set it to Neal thoroughly, and, when cold, pound and sift it ; when it is rightly burnt, it will be of a copper colour : put all these powders into several different boxes, and preserve them from dust and soil, for proper use.

To cast vegetables and insects :—Four parts of the above plaister of Paris, two parts brick dust, and two parts liver ore ; mix them well together, and sift them through a fine hair sieve, and, when you are ready to form your moulds, pour clean water to them, stir them well together to the thickness of a thin paste ; but you must be pretty nimble with this work, else it will harden under your hands and be of no use.

The mould you prepare thus :—Take the plant you design to cast, and spread the leaves and stalks so as not to touch one another ; then make a coffin, either of lead or clay, put your plant in it, so as not to touch the coffin ; at the bottom you may lay a piece of paper to keep the stuff from sticking to the board, but let your stuff be neither too thick nor too thin, for if it is of a right consistence it will force itself close to the plants and come out sharp ; let the stalks be carefully kept up for the inlet ; and, when you pour this stuff upon your plants, do it

it gently, and separate those leaves which might lie close to one another with a needle, pouring all the while, to make the mould the stronger. After this is hardened, put it in a dry place, and keep it until you have some more ready to cast, but you must secure it from frost.

If you would cast insects, or any small animal, or reptile, put them, in what position you will, upon a little board, brown paper, or pasteboard, which first must be anointed with oil, in order to make the plaister stuff come off the easier; about your insect make a little coffin, and if you can raise the insect, so as to be freed from the board or paper, it will be the better, which you may do by tying it with two or three hairs, fastening them at the top of the coffin, and by this means it will hang in the middle thereof; when this is ready, pour, as before directed, your plaister gently upon it, and after the mould is a little dry, it will be fit for use.

If you lay your insect, or other creature, upon the paper, you must make a wall about and cast your plaister upon it; let it stand a little, and, when dry, take off your wall, and cut the plaister round about the insect, and, taking the mould off the paper, there will be an opening at the bottom of the mould where the insect lies; turn this mould, and anoint it about the opening and the part on the insect with oil; then, casting some fresh plaister upon that plate, your mould will take asunder, and be very convenient to draw out the ashes of the insect, after it has been burned as is here directed.

Put your mould upon some warm wood ashes, then cover it with small coal, over the small coal lay charcoal, and then fling some lighted small coal
over

over them to kindle the others, so that the heat may be gently conveyed to the mould ; and after it has glowed some time, and you think the insect, or plant, is consumed to ashes, let it cool of itself with the fire about it, to hinder the air coming to it. When your mould is cold, open the hole for the inlet, and either with your breath, or with a little hand spout that is moist, draw out the ashes, and your mould is ready.

You may also burn those moulds in a muffle, if you close the muffle to prevent the air coming in, and lay the coals on and glow it as has been directed. After you have taken out the mould, put the same in warm sand, and having your silver, or other metal ready melted, pour it in quick ; but if you cast silver, fling into the flux a little sal-armoniac and borax, mixed together ; after it is cast, let the mould cool a little, then quench it in water, and the plaister will fall off of itself, brush the silver clean, and anneal and boil it as has been already directed.

To cast vegetables or insects in another manner :— Tie your plant, sprig, or insect, with a fine thread to a little stick, dip either of them into brandy, and let it dry a little, then temper your plaister of Paris, prepared as before directed, with water of sal-armoniac, pretty thin, and dip your plant, or insect in it all over ; then put the little stick in the hole against a wall, or any thing else, let it hang free, and in the drying you may display the leaves of the plant, or legs of the insect, as you would have them ; and when you have done this, hang it in the coffin, the little stick may rest on each end of the coffin ; then, pouring your plaister over, you will have an exact mould ; then proceed as directed before.

If you would have a small insect to stand upon a leaf, then dip the ends of its legs in turpentine, and put it on the plant before you dip it; if it is a spider or grasshopper, or any other insect which you think will be too strong for the turpentine, kill it first in vinegar, and after that put its legs in the turpentine, and fix it to the leaf of the plant.

To cast figures or medals in brimstone:—Melt in a glazed pipkin, half a pound of brimstone over a gentle fire, with this mix half a pound of fine vermillion, and when you have cleared the top, take it off the fire, stir it well together, and it will dissolve like oil; then cast it into the mould, after being first anointed with oil, let it cool, and take it out; but in case your figure should change to a yellowish colour, you must only wipe it over with aquafortis, and it will look like the finest coral.

How to form and cast all manner of small birds, frogs, fish, &c.—Take an earthen, iron, or tin ring, which is high and wide enough to hold the animal you design to cast, and set a ring upon a clean board, or pasteboard; then lay the animal upon it, and cast the fine mixture of plaister pretty thick over it, the rest of the vacancy you may fill up with a coarser plaister, even to the brim. When this is done, and pretty well dried, turn your ring, and putting a little short stick close to the body of the animal, cast a crust on that side, to cover that part which lay close to the board, and when dry, burn it, and go about the casting as directed; after you have burned or glowed it thoroughly, you must dry the ashes out of the hole which is made by the little stick, and this you may use for your inlet.

How

How to cast small shot :—Melt your lead in a ladle, then pour it gently in a continual stream into a pan or pail of water, on the surface whereof swims oil of a finger thick, and you will have a good round small shot.

Of casting in plaister :—If you will make a mould to cast an image, or animal in, take clean potter's clay, make thereof a coffin round about the image, which you lay long ways on a board, and anoint it over with oil ; then take fine plaister of Paris, mix it with water, and pour it all over the image, so that it may cover it every way ; then give it a stronger coat with a coarser sort, and when the plaister is dry, take off the coffin, and cut that side which is cast something flat, making some notches or marks upon it ; then turn it, and make a coffin about it again, and cast that side of the image, after you have anointed it with some oil all over, so that the whole may be entirely inclosed.

After the plaister has been a day or two upon the image it will be quite dry ; then, with a wooden mallet, beat cautiously against the plaister, till a piece thereof loosens, which being taken off, the rest will come off easy ; and after you have dismantled the whole, anoint the inside thereof with linseed oil, with a fine hair pencil brush, and let it dry in ; this do twice, and after they have lain two or three days, cut in an inlet, where you think it most convenient, and when you will cast with plaister of Paris, before you do it anoint the inside of the mould, and after you have put all the pieces in their places, and tied them together, cast your plaister, and let it stand half a day ; take the pieces, one after another, carefully off, in order to keep the image intire ;

but if you will cast wax in that mould, put only the mould, for half an hour before, in water, and the wax will not stick to it. If you will have the image hollow, then mind that the wax be not too hot; pour it into the mould, and you will easily see how thick it sticks to it. When you think it is thick enough, then turn your mould about, and pour out the wax that is remaining, and after you have, for a little while, laid it in water, take off the pieces of moulding, and you will have the image done to perfection. You must observe, that before you break the mould from the image on which you formed it, you must mark it all over with crosses, circles, or strokes, by which you may afterwards fix them right and exactly together, to cast again. If you will have the wax figures solid, then let the mould, with the images, lie for, half an hour, or more, to cool, in fair water.

To prepare the wax :—Take one pound of white rosin, that is not greasy, two pounds of wax, melt the wax, strain it through a cloth into a glazed pan, and stir it about till it is cool.

To cast medals and other things in bass relievo :—Lay your medal on a clean piece of paper, or a clean board, inclose it with a wall of clay or wax, then pour the plaister of Paris half an inch thick upon it; when it is dry take off the mould, and anoint it with clear sallad oil, two or three times, both within and without. If you will cast plaister of Paris, lay the mould first, for a quarter of an hour, in clear water; then cast your plaister as thick as you please.

You must observe, that whenever you make a mould of plaister, let it be for bass relievo or figures, you must always anoint it with oil, two or three times, which will not only preserve them from the damage

damage they otherwise would sustain from the water, but make the cast pieces come out clear.

Medals and figures in bas relief, how to cast them like jaspis:—To do this you must have a hand spout, or a glyster pipe, at the end whereof, fix a tin, or iron plate, full of round holes, some larger than others. In this spout put a paste, made of fine chalk of several colours; then force them out, in small shreds of mixed colours, in one piece; cut them with a fine edged knife in thin round slices, and put one into your mould, pressing it down gently; then pour the plaister of Paris upon it, and when dry, lay it first over with fish glue, and after that varnish it, and it will be of singular beauty.

The colours you may first dilute with gum-water, before you mix the chalk with them.

Another:—Take the above-mentioned chalk paste, and after you have mixed therewith a variety of colours, as smalt, white lead, vermillion, red lead, masticot, verdigrise, brown red, &c. and formed each colour separate into little cakes, then, with a rolling-pin, spread them like pye-crust, and when you have as many colours as you think proper, lay one leaf upon another, roll them together from one end to the other, and, with a knife, cut slices as thin as a wafer; take these and cover your mould with them, press it close down with your thumb, and pour the plaister of Paris over it; when dry, do it over with fish glue, and then varnish it, or give it a polish with a dog's tooth.

To cast fish, reptiles, fruit, or any kind of things, in a pewter plate, or dish:—Take a pewter plate or dish, garnish the same with either fish, reptiles, fruits, plants, &c. dispose them in proper order, as your fancy directs you; small animals, or leaves of plants
fasten

fasten to the dish with a little turpentine, and when every thing is in order, wall it round; then pour your plaster of Paris over it; strike upon the table the dish stands on, in order to make the casting fix the closer about the things; after the plaster is dry, make the mould for the back part of the dish; glow it, in order to burn the things to ashes, and having cleared your mould, fix them together for casting, then tie them round with wires, and make them red hot; cast your pewter, and in order not to make the dish too heavy, convey some little openings from the back part of the mould to the body, or hollow, of the animals, stopping the outside close up again till your casting is over; and when you think the pewter sufficiently fixed, then open these conveyances and pour out the pewter which may remain in the ingot melted.

If you would cast it in silver, then model your leaves, animals, &c. each separate and hollow, that they may be afterwards foldered on.

To cast figures in imitation of ivory:—Take singlafs and strong brandy, make it into a paste, with the powder of very fine grounded egg shells. You may give it what colour you please, but cast it warm into your mould, having oiled it all over; leave the figure in the mould till cold, then set them in the air to dry, and you will have them resemble ivory.

Another:—Take a sufficient quantity of egg shells, put them into an earthen vessel, lute it well, and let them be put into a potter's furnace, and they will burn to a white calx; if, after the first burning, they are not white enough, burn them a second time; then, with parchment-glue, mix it into a mass fit to be
cast

cast in moulds, wherein let them dry; if you will have your figures of different colours, you must colour your glue, for red, with brazil; for green, with verdigrise, &c.

Another mixture to cast figures in bass relievō:—Take flower of chalk, finely ground, mix it with clear glue well together, pour it into your mould, press it with the palm of your hand, and it will come out very fine: you may do this in what colour you please.

To cast with marble colours in plaister:—Take several colours, as vermillion, Dutch pink, yellow oker, smalt, &c. temper them with water, and mix every one apart with plaister; then take what colour you please, and first sprinkle your mould, which is best of brimstone, with one or more of them, with a little pencil or feather; then pour a colour different from what you sprinkled into the mould, and after it is hardened, give it a gloss with wax or varnish, as pleases you best.

A sand, in which one may cast things to the greatest nicety, whether flat or in bass relievō:—Take Fuller's earth, put it in a reverberatory furnace, so long till it is red hot; then take sal-armoniack about one pound, dissolve it in two quarts of water; with this water moisten the burnt earth, and, when cool, put it into the furnace, in a red hot pan; after it has glown there, take it out again; when the heat is a little over, sprinkle it with the above water again, till it is quenched; then give it another fire, and repeat this five or six times, the more the better it will receive the metal; then grind it to a very fine powder, put it into the frame, which may be either of brass, iron, or wood, but first
moisten

moisten it a little with the aforeſaid water; then make your impreſſion near the ingot, and having dried it before the fire, while it is hot, caſt your metal; the mould or impreſſion will be better the ſecond than the firſt time of uſing it, but every time you uſe it, make it firſt red hot.

To make horn ſoft:—Take one pound of wood aſhes, two pounds of quick lime, one quart of water; let it boil together to one third; then dip a feather into it, and if, in drawing it out, the plume comes off, it is boiled enough, if not, let it boil longer; when it is ſettled, filter it through a cloth; then put in ſhavings or filings of horn; let them ſoak therein three days, and anointing your hands firſt with oil, work the horn ſhavings into a maſs, and print, mould, or form it into what ſhape you pleaſe.

To caſt horn into moulds:—Take horn ſhavings, as many as you will, and lay them in a new earthen pot; take two parts of wood aſhes, and the third part of lime, pour clear lee upon it, ſo as to cover it all over, boil it well, ſtir it with an iron ladle, till it has the conſiſtence of paſte; if you will have it of a red colour, then take red lead or vermillion, as much as you think proper, and temper it with the paſte; then caſt it into a mould, and let it dry; and you may ſmooth it with a knife, and it will be of one ſolid piece; you may, in this manner, bring horn to what colour you will have it.

To caſt wood in moulds, as fine as ivory, of a fragrant ſmell, and in ſeveral colours:—Take fine ſaw-duſt of lime tree wood, put it into a clean pan, tie it cloſe up with paper, and let it dry by a gentle heat; then beat it in a ſtone mortar to a very fine powder,
ſift

sift it through cambrick, and lay it, if you do not use it presently, in a dry place, to keep it from dust. Then take one pound of fine parchment glue, the finest gum-dragant and gum-arabick, of each four ounces; let it boil in clean clear pump water, and filter it through a clean rag; then put into it of the said powder of wood, as much as will make it of the substance of a thick paste, and set it in a glazed pan in a hot sand, stir it well together, and let the rest of the moisture evaporate till it be fit for casting. Then pour or mix your colours with the paste, and put in oil of cloves, of roses, or the like, to give it a scent; you may mix it, if you will, with a little beaten amber; for a red colour use brasil ink. Your mould will be better of pewter, or brass, than of plaister of Paris; anoint it over with oil of almonds, and put your paste into it; let it stand three or four days to dry and harden, then take off your mould, and it will be as hard as ivory; you may cut, turn, carve, and plane it like other wood; it will be of a sweet scent; you may, if your mould will allow it, use several colours in one piece, leaving only in some part the natural colour of the wood, in order to convince the beholder what it is. It is a fine and curious experiment.

Of the mixture for casting mirrors, and other things for opticks:—We find the method for preparing these mixtures prescribed by several authors, but after different ways; wherefore I shall set down only a few, which, for the generality, are best approved of; and first,

Take three pounds of the best refined pewter, and one pound of refined copper; first melt the copper,

Ec. *the copper is melted* per,

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per, and then add the pewter to it; when both are in fusion, pour it out, and, when cold, beat it to powder; then take twelve ounces of red tartar, a little calcined tartar, three ounces of saltpetre, one ounce and a half of alum, and four ounces of arsenic; mix and stir this together, and, after it has done evaporating, pour out the metal into your mould; let it cool, and, when polished, you will have a fine mirror.

This is the composition which is commonly called the steel mixture.

Some artists will have the arsenic omitted, because it is apt to turn the mirror into a deadish blue colour, and requires new polishing every time one wants to use it, and they think that copper and pewter are sufficient to answer that purpose.

Another:—Take an earthen pan that is not glazed, and has stood the fire; put into it two pounds of tartar, also the same weight of crystalline arsenic, and melt it on a coal fire. When this mixture begins to smok, add to it fifty pounds of old copper, and put it into fusion for six or seven hours, so that it may be well cleansed; then add to it fifty pounds of pewter, and let them melt together; after this, take up some of the mixture with an iron, to see whether it is too hard and brittle; if so, then add a little more tin; and when you have the right temper, sling four ounces of borax over it, and let it stand in the furnace until it is dissolved, then pour it into your mould and let it cool; when it is cold, rub it first with brimstone and then with emery; and after the surface is made smooth and even, polish it with tripoli or tin ashes, and give it the finishing stroke with lamp-black; or, take copper one part, pewter three parts, and

and a very little arsenic or tartar; when these are put into fusion let them incorporate.

Some take of copper three parts, of pewter one part, and a little silver, antimony, and white flint.

Others do it with one part of lead, and two parts of silver.

After the metal is formed and cast, it is requisite to have it smooth and well polished; the first is done with emery, then with powder of brimstone or tin ashes, or else with tripoli; the polishing is done with pulverised chimney soot of wood fires, and the ashes of willow or cedar, which will give it a fine lustre. The emery is ground to a fine dust, and moistened with water; or, steel mixtures are also made out of one pound of pewter, and one third of copper; when these are melted, add two ounces of tartar, and one ounce of orpiment, and when evaporated, pour the mixture out into the mould. The casting of a flat mirror, or looking glass, is done upon a flat board, which must be made dry and warm, and covered with rosin or pitch; by this means the mirror is fixed to the board; when cold, rub it with sand and water, then with emery, or flower of brimstone, and at last polish it with tin ashes.

Another sort of steel mixture for mirrors:—Take good new copper, of that sort which is used for copper wire, eight parts; fine English pewter one part; bismuth five parts; put it together into a crucible and melt it. Then grease the mould all over with tallow, in order to cast your metal into it; when it is in fusion, dip a hot iron into it; what sticks to it let cool. If the colour is inclining to white it is right; but if to red, you must add some more pewter, until it has its right colour. Observe that whatever

you put to the melted metal, must first be made hot. After this manner you may form and cast whatever you please ; or melt one pound of copper, fling into it eight ounces of spelter, and when the spelter is in flame, stir it with a stick or iron rod, well together ; then add five or six ounces of fine pewter to it ; pour it into your moulds, smooth and polish it as has been directed above, and you will have a fine and bright mirror.

To cast iron :—Take clean filings of iron, wash them in lee, and then water ; mix them with as much powder of sulphur, put the mixture into a crucible, and give it a strong fire until it is in fusion ; if you manage it right, it will cast clean and smooth.

To cast steel :—Take of the best and finest steel, about one pound ; break it into bits, put it in a good strong crucible, and anneal it to a bright red colour. Then add sixteen or twenty-four ounces of good common steel, and anneal it thoroughly ; add then eight or ten ounces of arsenic glass, give it a violent fire, and it will melt and flux ; with this composition you may cast what you please.

The arsenic glass is prepared in the following manner.

“ Take one pound of white arsenic, two pounds of
 “ good saltpetre ; put it into a new pot that is not
 “ glazed, with a cover that has a little round hole in
 “ the middle ; lute it well all round, then let it dry,
 “ and when dry put the pot in a reverberatory fire
 “ for three hours, and there will evaporate out of
 “ the hole of the cover a red poisonous fume ; which
 “ you must take care of, and keep at some distance
 “ from it. The second hour, move the fire nearer
 “ the pot, and when the fumes cease, close the hole
 “ with

“ with some clay ; at the third hour put the coals
 “ close to the pot, and give it a thorough heat, then
 “ let it cool of itself, and at the opening of the pot
 “ you will find a white, sometimes a greenish white
 “ stone, which put up in a dry warm place free from
 “ the air, to prevent its melting ; of this you are to
 “ take five ounces, and of borax three ounces ; grind
 “ it well together, and let it melt in a large crucible
 “ until it is fluid ; pour this into a refining cup, and
 “ you will have a fine transparent matter ; what is
 “ not used, you may preserve from the air to keep it
 “ from dissolving.”

To cast iron as white as silver :—Take tartar, oil,
 and saltpetre, and mix it into a paste ; then put iron
 or steel filings into a crucible, set it on a charcoal
 fire, fling the mixture upon it, and it will dissolve
 and come out like silver.

To cast plaister of Paris on copper-plates :—First
 rub the colour, either red, brown, or black, into the
 graving, and wipe the plate clean ; then mix as
 much plaister as you think you shall have occasion
 for, with fresh water, to the consistence of a thin
 paste, and, having put a border round the plate, of
 four square pieces of reglet, pour the plaister upon
 it, and move it, so that it may run even all over the
 plate ; let it stand for an hour, or longer, according
 to the dimensions of the plate, and, when you find
 it dry, and turned hard, take off the reglets, and
 then the plaister, and you will have a fine impression
 of the copper graving. You must observe, not to
 mix more at a time than you have occasion for, or
 else it will grow hard before you can use it.

A mixture which may be used for making im-
 pressions of any kind, and which will grow as hard

as stone:—Take clean and fine sifted ashes, and fine plaister of Paris, of each an equal quantity, and temper the mixture with gum water, or with size of parchment; knead it well together, and press it down into your mould; but do not prepare more than what you use presently, else it will harden under your hands. You may give it what colour you please; in mixing it for black, take lamp-black; for red, vermillion; for white, flake white; for green, verdigrise; for yellow, Dutch pink, &c.

You may, instead of gum or size, use the whites of eggs, which is more binding.

To impress figures in imitation of porcelain:—calcined and fine pulverized egg-shells, worked with gum-arabic and the white of eggs into a dough, then pressed into a mould, and dried in the sun, will come out sharp, and look fine.



Of BRONZING.

BRONZING is colouring, by metaline powders, plaister, or other busts and figures, in order to make them appear as if cast of copper or other metals.

This is sometimes done by means of cement, and sometimes without, in the instance of plaister figures; but the bronzing is more durable and secure when a cement is used.

Gold powders, and aurum mosaicum, are frequently employed for this purpose; but the proper bronzing ought to be of a deeper and redder colour, more resembling copper; which effect may be produced

duced by grinding a very small quantity of red lead with these powders; or the proper powder of copper may be used; and may be prepared as follows:

“ Take filings of copper, or slips of copper-plates;
 “ which dissolve in any kind of aquafortis, and put
 “ into a glass receiver, or other proper formed vessel.
 “ When the aquafortis is saturated with the copper,
 “ take out the slips of the plates; or, if filings were
 “ used, pour off the solution from what remains un-
 “ dissolved; and put into it small bars of iron, which
 “ will precipitate the copper from the aquafortis in
 “ a powder of the proper appearance and colour of
 “ copper. Pour off the water then from the powder,
 “ and wash it clean from the salts, by several suc-
 “ cessive quantities of fresh water.”

The true gold powder may be well and easily made by the following method:

“ Take any quantity of leaf gold; and grind it
 “ with virgin honey, on a stone, till the texture of
 “ the leaves be perfectly broken, and their parts di-
 “ vided to the minutest degree. Then take the mix-
 “ ture of gold and honey from off the stone, and put
 “ it into a china or other such basin, with water;
 “ then stir it well about, that the honey may be melt-
 “ ed, and the gold by that means freed from it. Let
 “ the basin afterwards stand at rest, till the gold be
 “ subsided; and when it is so, pour off the water
 “ from it, adding fresh quantities till the honey be en-
 “ tirely washed away; after which, the gold may be
 “ put on paper, and dried for use.”

The aurum mosaicum, which is tin coloured, and rendered of a flaky or pulverine texture, by a chemical process, so as greatly to resemble gold powder, is prepared in the following manner:

“ Take

"Take of tin one pound, of flowers of sulphur seven ounces, and of sal ammoniacus and purified quick-silver, each half a pound. Melt the tin and add the quicksilver to it in that state; and when the mixture is become cold, powder it, and grind it with the sal ammoniacus and sulphur, till the whole be thoroughly commixt. Calcine them then in a mattrafs, and the other ingredients subliming, the tin will be converted into the aurum mosaicum; and will be found in the bottom of the glass like a mass of bright flaky gold powder; but if any black or discoloured parts appear in it, they must be carefully picked or cut out."

Where the appearance of brass is designed, the gold powders, or the aurum mosaicum, may be mixed with a little of the powder called argentum musivum; the preparation of which is treated of under the article silvering.

Where the appearance of silver is wanted, the argentum musivum is the best and cheapest method; particularly as it will hold its colour much longer than the true silver used either in leaf or powder.

Where no cement is used in bronzing, the powder must be rubbed on the subject intended to be bronzed, by means of a piece of soft leather, or fine linen rag, till the whole surface be coloured.

The former method of using cement in bronzing was, to mix the powders with strong gum water, or isinglass size; and then, with a brush, or pencil, to lay them on the subject. But at present some use the japanners gold-size; and proceed in all respects in the same manner as in gilding, with the powders in other cases; for which ample directions will be given.

This

This is the best method hitherto practised; for the japanners gold size binds the powders to the ground, without the least hazard of peeling or falling off, which is liable to happen when the gum water, glovers, or isinglass sizes are used; though, notwithstanding the authority of the old practice for the contrary, even these cements will much better secure them, when they are laid on the ground, and the powders rubbed over them, than when both are mixed together, and the effect, particularly of the aurum mosaicum, will be much better in this way than the other. The gold size should be suffered, in this case, to approach much nearer to dryness than is proper in the case of gilding with leaf gold, as the powders would otherwise be rubbed against it in the laying them on.

The fictitious silver powder, called the *argentum musivum*, may, as abovementioned, be applied in the manner of bronze, by those whose caprice disposes them to silver figures or busts; but it is the only sort of silver powder that should be used in this way, for the reason above given; and all such kind of silvering is much better omitted; for the whiteness itself of plaister in figures or busts, and much more a shining whiteness, is injurious to their right effect, by its eluding the judgment of the eye, with respect to the proper form and proportion of the parts, from the false and pointed reflections of the lights, and the too faint force of the shades. To remove which inconvenience it is probable was the first inducement to bronzing.

The METHOD of preparing and moulding
PAPIER MACHE.

THE papier maché is paper reduced to the consistence of a pulp by boiling and beating, till it be of such consistence, that, being cast in a moist state, in proper moulds, it will receive the form or impression of the figure of the mould; and, being previously commixt with some gummous, or other adhesive body, will acquire a considerable tenacity and hardness, so as to retain the figure, and answer the end of wood turned, or carved, or plaister cast into the same form.

The paper used for making papier maché may be of any kind, according to the nicety required in the work to which it is applied. For very coarse purposes common brown may be employed, and, for the most nice, writing paper is best. It is not very material whether the paper be clean or foul, or whether it be written or printed upon, or blank, except where it might be intended to be only moulded, and not coloured, or varnished afterwards, which is seldom the case.

The gum, or adhesive body, used for giving due texture to the papier maché, may be gum-arabic, glue, or isinglass; but, for ordinary purposes, gum-arabic, or glue, are used, isinglass being too dear; and, indeed, gum-arabic has an advantage over either of the others, of not shrinking near so much in drying.

The preparation of the papier maché may be as follows:—"Take any quantity of paper, and boil it
in

“ in water, stirring it about with a wooden spatula,
 “ till it become of a pasty substance, and appears to
 “ have lost its cohesion ; pour off then the water
 “ from it, and beat it in a mortar, or such kind of
 “ machine as will have the same effect, till it be per-
 “ fectly soft and yielding pulp. Prepare, in the mean
 “ time, a strong gum water, by dissolving gum-arabic
 “ in water ; and, having pressed the greatest part of
 “ the water out of the pulp, add the gum water to it,
 “ in such proportion, that they produce together the
 “ consistence of a thick fluid. Put them then into a
 “ proper vessel, and boil them slowly, till they form
 “ a paste of the right consistence for casting.” The
 papier maché will then be ready prepared for work-
 ing with the proper moulds ; but the stiffness of the
 paste may be varied according to the nature of
 the work. That intended for pieces where the figure
 is simple, and has no sharp or embossed work, re-
 quiring to be stiffer, while embossed work, or other,
 such as has relieved parts, should be thinner. The
 using glue or size, instead of gum-arabic, makes a
 saving, and will answer extremely well in the case
 of boxes, or any other pieces of a simple or flat form ;
 because the shrinking may be allowed for in the
 figure of the moulds ; but for embossed work, or de-
 signs, where several parts must be joined together,
 the use of gum-arabic will be found more expedient ;
 as the relative proportions will be much better
 preserved.

The moulds, in which the papier maché is cast, may
 be either of plaister of Paris or wood. For embossed
 work, or designs of a more complex kind, plaister
 is preferable ; but for boxes, cups, or simpler forms,
 the moulds may be best of wood, as such will last

for a long time, and not require renewing so often, from the unavoidable wear, or the injury of a slight accidental violence, as those made of plaister. But in the choice of moulds, and subjects to which they are applied, regard should be had to the figure, with respect to its roundness, or projecting parts; for, embossed work, or frames of any kind, where there are a variety of angles on one side, and a flat plainness on the other, are most expediently managed in plaister; and, where there are nice joints, as in the case of boxes, or where the figure must be preserved on both sides, wood is much more proper. The plaister moulds, for casting the papier maché, must be made in the same manner as those for casting in plaister; see p. 211; but it is peculiarly necessary in casting the papier maché, to grease the moulds extremely well; otherwise there will be a cohesion betwixt the matter cast and the moulds, that will be destructive to both. Where any subject is of considerable extension, and one side of it a blank reverse, as in the case of bas-reliefs, and other ornaments of that nature, it is usual to lay slips of whole strong paper over the papier maché; such paper being first well moistened with gum water, or strong size, which is rather better in this case. This not only makes a saving, but is really an advantage to the work, as it adds greatly to the strength and tenacity, and more especially preserves it, during the time of its drying, from the injuries of a slighter violence. To answer this end more effectually, the paper itself applied to this purpose should, however, be very strong; and, where the nature of the subject admits of it, laid on several times.

The wooden moulds, which are the most proper sort for forming boxes, cups, or flat pieces of any kind, where there is no embossed work, must be made in two parts; or, more explicitly, there must be a convex part, and a concave part; betwixt which a space must be allowed for the figure of the subject that is to be cast. These may be best made of box, or other hard wood turned into the proper figure; and it is expedient to have two or three small perforations, or holes, through the substance of the wood of the concave part, near the middle, to let out the fluid, when the papier maché is compressed, to give it the due form. The hollow, betwixt the convex and concave parts of the mould, may be about the seventh or eighth part of an inch thick, in the case of snuff or dressing boxes, or other pieces of the like magnitude; but it may be enlarged when greater subjects come in question. The moulds, when first used, should be well greased, and placed before a fire, that they may imbibe, as much as possible, of the grease, which will render the oiling them afterwards, each time they are employed, more effectual.

When the moulds are prepared, the surface of the concave or hollow part must be spread over with the paste, as evenly as possible; and as nearly as can be judged, of the thickness of the hollow betwixt the two parts; and then the cover or solid part of the mould must be put over the paste, and compressed till it be in its proper place. The casting being thus made, it must be suffered to remain in the mould, till it gains a sufficient strength and tenacity of parts, by drying, to be able to maintain its form when taken out; and then, being freed from both parts of the mould, it must be dried, and afterwards varnished or painted

painted, according to the purpose for which it is designed.

Of the manner of moulding, &c. the whole paper for the forming snuff-boxes, cups, &c.—The manner is much the same as that of the papier maché; but it can be only applied advantageously to the forming a piece, where the surface is flat, and without embossed or raised work, and therefore moulds of wood are proper. The paper employed for this purpose should be the strongest brown kind; the texture should be equal; and, if any lumps or grosser inequalities are found, they should be taken off the paper. Being cut in pieces, of such a figure and size, as may best suit the form of the mould, it should be then moistened with gum water, till it be pliable and soft; but not so soaked, or macerated, as to render it too weak and tender to bear adapting to the form of the mould. The slips or pieces should be then laid to the convex or solid part of the mould, which should be first well oiled; each should then be brushed over, after it is laid on, with a paste of a thin consistence, made by boiling flour and water for a long time, and adding afterwards about two ounces of common size to a pound of the paste. Other slips must be afterwards laid on the first, in the same manner, for three or four layers, according to the thickness and strength required in the work. When there is a due thickness of the slips laid on, the hollow mould should be put over them, and pressed down to its proper place, and there continued for some time; after which it may be taken off, but the paper must not be separated from the convex or solid mould, till it has a sufficient hardness to support itself in the form given to it by the mould. Snuff-boxes,

boxes, and such other pieces as have lids, or are to be made in two parts with joints, must have separate moulds for the forming the two parts, in the manner above directed for the papier maché; but cups, saucers, or other such pieces, may be formed on solid or convex moulds only, the exterior surface being rendered even and smooth by dressing it with an ivory knife, or other instrument of the like kind; and a china or other cup already formed may, on occasion, serve for the mould.

The boxes, cups, &c. formed of whole paper, in this manner, ought always to be afterwards coated with a good varnish, if they be intended to bear any wear, or to contain any fluid; but, if they be intended only for the ornaments of chimney-pieces, or other such purposes, they may be painted with fat oil, tempered with oil of turpentine, and mixed with any pigment of the colour that is desired to be given them.

Of the manner of preparing the matter and moulding the light japan ware:—"Take saw-dust of
 "fir wood, and sift off, by the use of two sieves of
 "different fineness, all the most gross part and the
 "smallest; melt then equal parts of rosin and tur-
 "pentine, with a half part of bees-wax; and put
 "into the melted mixture as much of the saw-dust
 "as can be added without rendering the mass of a
 "thicker consistence than can bear to be poured.
 "Stir the saw-dust and melted matter together till
 "they be thoroughly mixt, and then cast them after
 "in proper moulds. If it be desired to render the
 "matter harder, a little shell-lac or gum sarcocolla
 "may be added in powder to the mixture; but this
 "should not be done before the saw-dust be well
 "united

“ united with the other ingredients, and the matter
 “ should be kept no longer on the fire afterwards
 “ than may be necessary for melting and mixing the
 “ shell-lac, or gum sarcocolla with the rest. The whole
 “ of this mixture should be used at one time, for it
 “ cannot be brought to a proper state for casting by
 “ being re-heated, without damaging it by burning.”

The cups, boxes, or other vessels formed of this matter, ought to be cast in double moulds, like the papier maché; which may be made of wood turned, or of lead, pewter, or other metals; but care should be always taken to grease the moulds very carefully; or, otherwise, this matter, being very adhesive, will glue the parts together, so that they cannot be separated without difficulty. The cups formed of this matter may be made thin, as it is very tenacious, and they will be extremely light.

This composition is not superior to the papier maché, or the whole paper, for making snuff-boxes, or other such pieces as are not to contain fluids; but for cups, saucers, and such vessels as are required to bear moisture, it is far preferable; and, when varnished, in a proper manner, is more elegant than china, with the advantage from its lightness, of not heating so as to burn the lips, as vessels of a heavier matter are subject to do.

The manner of painting, gilding, and varnishing the snuff-boxes, or other such pieces, formed of the papier mache, the whole paper, or saw-dust, may be the same as in other japanned work; for which directions have been given under the treatise of japanning. When the painting, varnishing, gilding, &c. is performed, it is proper, in all cases, where great firmness and hardness of the varnish is required,

quired, to bake the pieces in a proper stove; beginning with a gentle heat, and increasing the degree to the greatest that can be given, without changing the colour of the varnish, or the painting, by burning them; but this is more particularly requisite in the case of cups and saucers made of the whole paper, or saw-dust, which are to bear hot water; for there baking them for a considerable time, in a strong heat, renders the varnish proof against any injury that could be done to it, even by boiling water.

The true japan black lacquer, (which is now frequently brought from China) has been, sometimes, used for the varnishing snuff-boxes, cups, and all such pieces, made of the paper, or saw-dust; but this lacquer, being the concreted juice of the toxicodendron tree, its poisonous qualities are almost constantly fatal to those who work with it for any length of time, and, sometimes, even on very slight intermeddling with it: such a momentous inconvenience, together with the tediousness of dispatching the work, on account of its great tardiness in drying, being extremely good reasons against its use, it is more advisable to employ the common kinds of varnish, which, when managed judiciously, may be rendered nearly both as beautiful and durable, without either the danger or the difficulty attending the other.

When the true japan varnish is, however, used, all heat must be avoided; for, contrary to the nature of most other substances of the same kind, this dries best when most exposed to moisture, and can, indeed, only be brought to a proper state of hardness, by keeping it in some place which is either naturally damp, or made so artificially.

OF GILDING.

THE principal kinds of gilding are those called oil gilding, burnish gilding, and japanner's gilding, or gilding with gold size; these may be promiscuously used on grounds either of wood, metal, or any other firm and rigid body; but paper and leather require a treatment, in some cases, peculiar to themselves.

The first attention, in most kinds of gilding, is the choice of leaf gold, which should be pure, and of the colour accommodated to the purpose, or taste, of the work. Purity is requisite in all cases, for if the gold be allayed with silver, it will be of too pale and green a hue for any application; and, if it contain much copper, it will, in time, turn to a stronger green: the best method, however, of judging of the colour of leaf gold, with nicety, is by keeping a specimen of such as is perfect, with which any fresh parcel may be compared.

There is, besides the true leaf gold, another kind in use, called Dutch gold, which is copper gilt, and beaten into leaves like the genuine; it is much cheaper, and has, when good, greatly the effect of the true, at the time of its being laid on the ground; but, with any access of moisture, it loses its colour, and turns green in spots, and, indeed, in all cases, its beauty is soon impaired, unless well secured with lacquer or varnish.

Of the instruments that are commonly used in gilding:—The first necessary instrument is a cushion, for receiving the leaves of gold from the paper, in
order

order to its being cut into proper size and figures, for covering the places to be gilt. This cushion should be made of leather, and fastened to a square board, which should have a handle; it may be of any size from fourteen to ten inches square, and should be stuffed, between the leather and board, with fine tow or wool, but in such a manner that the surface may be perfectly flat and even.

A proper knife is the next, and an equally requisite instrument, as it is necessary, in all cases, to cut or divide the gold into parts, correspondent to those which are to be covered; this knife may be the same, in all respects, as those used in painting, called pallet knives; the blade of which may be five or six inches long, and somewhat more than half an inch in breadth, with an handle proportionable.

A squirrel's tail is likewise generally provided, for taking up whole leaves, and for compressing the gold to the surface where it is laid, and giving it the position required; it is used also, by some, for taking up the parts of leaves, but this is better done by means of a ball of cotton wool, which will both answer this end and that of compressing the gold, in a more easy and effectual manner. This squirrel's tail is cut short, and, sometimes, spread in the fan fashion, by means of a piece of wood, formed like a pencil stick, but broad at one end, and split, to receive the tail; but it will equally serve the purpose in its own form, when the hair is cut to a proper length. This instrument is, by some, called a pallet, but improperly, as the board for holding the colours, in painting, and which is frequently in use with this, being called by the same name, would necessarily produce a confusion in speaking of either.

A brush of very soft hog's hair, or of the fitch kind, made large, is likewise commonly used for passing over the work, when it is become dry, in order to take off the loose gold.

Some fine cotton wool is also necessary for taking up the smaller parts of the leaves and laying them on the work; as also for compressing and adjusting them when laid on; the cotton should be formed into a ball, by tying it up in a piece of very fine linen rag; for if it be used without the rag, the fibres adhere to the gold size, and embarrass the work.

A small stone and mullar, with a proportionable pallet knife, are required to grind the mixtures made of the fat oil, or gold size, with each other, and the colours that may be added to them; proper brushes are also wanted for laying on and spreading the fat oil, or size, on the work; and some of these should be fitches of different sizes, in order to convey, and settle the gold, where the relief of carved work forms deep hollows.

These are all the instruments that are common to all the three principal kinds of gilding.

Of the manner of oil gilding, and the preparation of fat oil:—The gilding with oil is the most easy and cheap, as well as most durable kind, and, therefore is mostly applied to common purposes; it is performed by cementing the gold to the ground, by means of fat oil; the preparation of which is therefore previously necessary to be known, and may be much better managed in the following manner, than by any method hitherto taught, or commonly practised.

“ Take

" Take any quantity of linseed oil, and put it into
 " an earthen, or any other vessel of a broad form, so
 " that the oil may lie in it with a very large surface;
 " but the proportion should be so limited that the oil
 " may be about an inch thick in the vessel: the
 " earthen pans used for milk in the forming cream
 " for butter, are very well accommodated to this
 " purpose. Along with the oil as much water should
 " also be put in the vessel as will rise six inches, or
 " more, above the bottom; place the vessel then,
 " with oil swimming in the water, in an open place,
 " where sun and rain may have access to it, but
 " where it may be as free from receiving dust and
 " filth as possible; let it stand in this condition, stir-
 " ring the contents on every opportunity, for five or
 " six weeks, or till it appear of the consistence of
 " treacle; take the oil then from off the water into
 " a phial, or bottle of a long form, or what is better,
 " into a separating funnel, such as is used by the
 " chemists, and there draw off the remainder of the
 " water; place it afterwards, being in the long bottle
 " or phial, in such heat as will render it perfectly
 " fluid, and the foulnesses it may contain, will soon
 " subside to the bottom, when the clear part must be
 " poured off, and the remainder strained through a
 " flannel, while yet warm, and the whole will then
 " be fit for use."

It is to be observed, that this method is only practicable in summer, the sun not having sufficient power in winter to produce a due change in the oil.

This method differs from that commonly practised in the addition of water, which suffers the foulness to separate from the oil, and sink to the bottom, where it remains, without being again mixed with the

the oil every time it is stirred, as is unavoidable where no water is used; the water likewise greatly contributes to bleach the oil and improve it in other respects.

The best previous preparation of the piece to be gilded, if it have not already any coat of oil paint, is to prime it with drying oil, mixed with a little yellow oker, to which also may be added, a small proportion of vermilion. But where greater nicety and perfection is required in the work, the wood should be first rubbed with fish skin, and then with Dutch rushes.

This priming being dry, the next part of the operation is the sizing the work; which may be done either with the fat oil alone (but diluted with drying oil, if too thick to be worked without) or with fat oil and the japanners gold size, either in equal quantities, or in any less proportion, with respect to the gold size. The difference betwixt the use and omission of the gold size, in this way of gilding, lies in two particulars; the one is, that the sizing dries faster according to the proportion of the quantity of the gold size to the fat oil, and is consequently so much the sooner fit to be gilded; the other is, that the gilding is also rendered in the same proportion, less shining, or glossy, which is esteemed a perfection in this kind of gilding; though taking away the prejudice of fashion, I should think the most shining, the most beautiful, and of the strongest effect.

The fat oil, or the compound of that and the gold size, must be ground with some yellow oker, and then, by means of a brush laid thinly over the work to be gilt; but in doing this care must be taken to pass the brush into all the cavities, if the subject be carved,

ed, or have any way projecting parts, for where the size fails to be laid, the gold will never take till the work be again repaired, by going over the defective places with fresh size, which should be avoided as much as possible: where great perfection is required, the gold should not be laid on the first sizing, but that being suffered to dry, the work should be again sized a second time; and, some who are very nice even proceed to a third.

The work being thus sized, must be kept till it appear in a condition to receive the gold, which must be distinguished by touching with the finger; if it appear then a little adhesive, or clammy, but not so as to be brought off by the finger, it is in a fit condition to be gilt; but if it be so clammy as to daub, or come off on being touched, it is not sufficiently dry, and must be kept longer; or, if there be no clamminess, or sticky quality remaining, it is too dry, and must be sized over again before it can be gilt.

When the work is thus ready to receive the gold, the leaves of gold, where the surface is sufficiently large and plain to contain them, may be laid on entire, either by means of the squirrel's tail, or immediately from the paper in which they were originally put: being laid on the proper parts of the work, the leaves must then be settled to the ground, by compressing those which appear to want it, gently with the squirrel's tail, or cotton ball; and if any part of the gold has flown off, or been displaced, so as to leave a naked, or uncovered spot, a piece of another leaf, of size and figure correspondent to such spot, must be laid upon it; where the parts are too small to admit of the laying on whole leaves, or where vacancies are left after laying on whole leaves
which

which are less than require others to cover them ; the leaves which are to be used, must be first turned from the paper upon the cushion ; they must then be cut into such divisions, or slips as may be commodiously laid out on the parts of the work to be covered ; after which, being separated, and taken up as they are wanted, by means of the cotton wool, to which, being breathed upon, they will adhere, they must be laid in the places they are designed to cover, and gently pressed with the cotton, till they touch every where, and lie even on the ground.

Where the work is very hollow, and small pieces are wanted to cover parts that lie deep and out of the reach of the squirrel's tail, or the cotton, they may be taken up by the point of a fitch pencil, (being first breathed upon) and by that means conveyed to and settled in their proper place. Those who are accustomed to it, use the pencil commodiously, for a great part of the work, where large parts of the leaves cannot be used.

The whole of the work being thus covered, should be suffered to remain till it be dry, and it may then be brushed over by a camel's hair pencil, or soft hog's hair brush, to take off from it all loose parts of the gold.

If, after the brushing, any defective parts, or vacancies appear in the gilding, such parts must be again sized, and treated in the same manner as the whole was before ; but the japanner's gold size alone is much better for this purpose than either the fat oil alone, or any mixture.

Of burnish gilding, with the preparation off the proper sizes, &c.—The gilding with burnished gold is seldom practised but upon wood, and, at present,
mostly

mostly in the case of carved work, or where carved work is mixed with plain: the chief difference in the manner betwixt this and oil gilding lies in the preparing the work to receive the gold, and in the substituting a size, made of parchment, or the cuttings of glovers' leather, in the place of fat oil, as a cement; the preparation of this oil should therefore be previously known, and may be as follows:

"Take a pound of cuttings of parchment, or of the leather used by glovers, and, having added to them six quarts of water, boil them till the quantity of fluid be reduced to two quarts; or till, on the taking out a little, it will appear like a jelly on growing cold; strain it through flannel while hot, and it will be then fit for use."

This size is employed in burnish gilding, not only in forming the gold size, or cement for binding the gold to the ground, but also in priming, or previously preparing the work. But before we proceed to shew the manner of using it so, it is necessary to give the compositions for the proper cement, or gilding size employed in this kind of gilding. There are a multiplicity of recipes for this composition, which are approved of by different persons; but, as in general they vary not essentially from each other, I will only give two, which I believe to be each the best in their kinds.

"Take any quantity of bole armoniac, and add some water to it, that it may soak till it grow soft; levigate it then on the stone, but not with more water than will prevent its being of a stiff consistence, and add to it a little purified suet, or tallow scraped, and grind them together. When this is wanted for use, dilute it to the consistence of
H h cream,

“cream, by parchment, or glovers’ size, mixed with
 “double its quantity of water, and made warm. Some
 “melt the suet, or tallow, and mix it previcully
 “with five, or six times its weight of chalk before it
 “is put to the bole, to facilitate their commixture;
 “to which, in this wet state, they are otherwise some-
 “what repugnant: it is also sometimes practised to
 “put sope-suds to the bole, which will contribute to
 “its uniting with the tallow.”

To prepare the wood for burnish gilding, it should first be well rubbed with fish skin, and then with Dutch rushes; but this can only be practised in the larger and plainer parts of the work, otherwise it may damage the carving, or render it less sharp, by wearing off the points; it must then be primed with the glovers’ size, mixed with as much whiting as will give it a tolerable body of colour; which mixture must be made by melting the size, and strewing the whiting in a powdered state gradually into it, stirring them well together, that they may be thoroughly incorporated. Of this priming seven or eight coats should be given, time being allowed for the drying of each before the other be put on; and care should be taken, in doing this, to work the priming well, with the brush into all the cavities, or hollows there may be in the carved work: after the last coat is laid on, and before it be quite dry, a brush pencil dipt in water should be passed over the whole, to smooth it and take away any lumps, or inequalities that may have been formed; and when it is dry, the parts which admit of it should be again brushed over, till they be perfectly even: the work should then be repaired, by freeing all the cavities, and hollow parts from the priming, which may choak them, or injure

the relief of the carving ; after which, a water polish should be given to the parts designed to be burnished, by rubbing them gently with a fine linen rag, moistened with water.

The work being thus prepared, when it is to be gilt, dilute the composition of bole, &c. with warm size, mixt with two thirds of water ; and, with a brush, spread it over the whole of the work, and then suffer it to dry, and go over it again with the mixture, in the same manner, at least once more. After the last coat, rub it, in the parts to be burnished, with a soft cloth, till it be perfectly even. Some add a little vermilion to the gilding size, and others colour the work, if carved, before it be laid on, with yellow and the glover's size, to which a little vermilion or red lead should be added. This last method is to give the appearance of gilding to the deeper and obscure parts of the carving, where the gold cannot, or is not thought necessary, to be laid on ; but this practice is at present much disused, and, instead of it, such parts of the work are coloured after the gilding, which treatment is called *matting*.

The work being thus properly prepared, set it in a position almost perpendicular, but declining a little from you, and, having the gilding size, place all the necessary instruments above described ready, as also a basin of clean water ready at hand ; wet then the uppermost part of the work, by means of a large camel's hair pencil, dipped in water, and then lay on the gold upon the part so wet, in the manner above directed for gilding in oil, till it be completely covered, or become too dry to take the gold. Proceed afterwards to wet the next part of the work,

or the same over again, if necessary, and gild it as the first; repeating the same method till the whole be finished. Some wet the work with brandy, or spirit of wine, instead of water; but I do not conceive any advantage can arise from it, that may not be equally obtained by a judicious use of water. This manner is, moreover, much more troublesome and difficult, as well as expensive, for only a small part must be wet at one time, and the gold laid instantly upon it, or the brandy or spirits will fly off, and leave the ground too dry to take the gold.

The work, being thus gone over with the gilding, may be then examined; and such parts as require it repaired, by wetting them with the camel's hair pencil, and covering them with the gold; but as little as possible of the perfect part of the gilding should be wet, as the gold is very apt to turn black in this state. When the repaired part also is dry, the work must be matted, if it require it; that is, the hollow parts must be covered with a colour the nearest in appearance to gold. For this purpose some recommend red lead, with a little vermilion ground up with the white of an egg; but I think yellow oker, or Dutch pink, with red lead, would better answer the end; or the terra di sienna, very slightly burnt, or mixed with a little red lead, would have a much better effect, and be more durable than any other mixture so near the colour of gold in shade. Ifinglass size will likewise equally well supply the place of the whites of eggs in the composition of matting.

The work being thus gilt, it must remain about twenty-four hours, and then the parts of it that are designed to be burnished, must be polished with a dog's tooth, or with the burnishers of agate or flint,
made

made for this purpose; but it should be previously tried, whether it be of the proper temper as to the dryness; for though twenty-four hours be the most general space of time in which it becomes fit, yet the difference of season, or the degree of wet given to the work, makes the drying irregular, with regard to any fixt period. The way of distinguishing the fitness of the work to take the burnish, is to try two or three particular parts, at a distance from each other; which, if they take the polish in a kind manner, the whole may be concluded fit; but if the gold peel off, or be disordered by the rubbing, the work must be deemed not yet dry enough; and, if the gold abide well the rubbing, and yet receives the polish slowly, it is a proof of its being too dry, which should be always prevented by watching the proper time; for the work, when too dry, both requires much more labour to burnish it, and fails at last of taking so fine a polish.

Of jappanners gilding:—The jappanners gilding is performed by means of gold powder, or imitations of it, cemented to the ground by a kind of gold size much of the nature of drying oil, for the making of which there are various recipes followed by different persons; we shall, however, only give one, which is much approved:

“Take of linseed oil one pound, and of gum animi four ounces; set the oil to boil in a proper vessel, and then add the gum animi gradually in powder, stirring each quantity about in the oil, till it appears to be dissolved; and then, putting in another, till the whole be commixt with the oil, let the mixture continue to boil, till, on taking a large quantity out, it appear of a thicker consistence

“once than tar; and then strain the whole through
 “a coarse cloth, and keep it for use. But when it is
 “wanted, it must be ground with as much vermilion
 “as will give it an opaque body, and, at the same
 “time, diluted with oil of turpentine, so as to render
 “it of a consistence proper for working freely
 “with the pencil.”

This gold size may be used on metals, wood, or any other ground whatever; but, before I enter on the particular manner of gilding with it, the preparation of the true and counterfeit gold powders are necessary to be shewn.

For the method of making the true gold powder see page 223.

A gold powder of a more intense yellow colour, brighter than this, may be made by a precipitation from gold, dissolved in aqua regia, by means of either green or Roman vitriol.

The German gold powder, which is the kind most generally used, and, where it is well secured with varnish, will equally answer the end in this kind of gilding with the genuine; may be prepared from the sort of leaf gold, called the Dutch gold, exactly in the same manner as the true.

The aurum mosaicum, the preparation of which is given in page 224, may likewise be used in this kind of gilding.

The sal ammoniacus employed in the preparation of the aurum mosaicum ought to be perfectly white and very clean; and care should be taken, that the quicksilver be not such as is undiluted with lead; which may be known by putting a small quantity, in a crucible, into the fire, and observing, when it is taken out, whether it be wholly sublimed away,

or have left any lead behind it. The calcination may be best performed in a coated glass body, hung in the naked fire; and the body should be of a long figure, that the other ingredients may rise so as to leave the coloured tin clear of them; the quicksilver, though it be formed into cinnabar along with the sulphur, need not be wasted, but may be revived, by distilling it with the addition of quicklime.

There are some other coarser powders in imitation of gold, which are formed of precipitations of copper, but they are seldom used now for gilding.

Besides these powders the genuine leaf or Dutch gold may be used with the japanners gold size, where a more shining and glossy effect is desired in the gilding; but in that kind of gilding which is intended to be varnished over, or to be mixed with other japan work or paintings in varnish, the powders are most frequently employed.

The gilding with japanners gold size may be practised on almost any substance whatever, whether wood, metal, leather, or paper; and there is no further preparation of the work necessary to its being gilt, than the having the surface even and perfectly clean.

The manner of using the japanners size is this; put then a proper quantity of it, prepared as above directed, and mixed with a due proportion of oil of turpentine and vermilion into a small gallypot, then either spread it with a brush over the work, where the whole surface is to be gilt, or draw with it, by means of a pencil, the proper figure desired; avoid carefully not to let it touch any other parts; suffer it afterwards to rest till it be fit to receive the gold,
which

which must be distinguished by the finger, in the same manner as with the fat oil ; the having a proper clamminess, or sticking quality, without being so fluid as to take to the finger, being alike the criterion in both cases ; being found of a proper dryness, when the gold powders are to be used, a piece of the soft leather, called wash-leather, wrapt round the fore-finger, must be dipped in the powder, and then rubbed very lightly over the sized work ; or, what is much better, the powder may be spread by a soft camel's hair brush : the whole being covered, it must be left to dry, and the loose powder may then be cleared away from the gilded part, and collected, by means of a soft camel's hair brush. When leaf gold is used, the method of sizing must be the same as for the powders, but the point of due dryness is very nice, and delicate in these cases ; for the leaves must be laid on while the matter is in a due state, otherwise the whole of what is done must be sized and gilt over again.

When more gold size is mixed up with the oil of turpentine and vermillion, than can be used at any one time, it may be kept by immersing it under water till it be again wanted ; which is indeed a general method of preserving all kind of paint, or other such compositions as contain oily substances.

Of gilding paper, and vellum, or parchment :—there are a variety of methods used for gilding paper, according to the several ends it is designed to answer ; but for the most part, size, properly so called, and gum water, are used as the cements, and the powders are more generally employed than the leaf gold. As I have given the preparation of these severall substances before, it is needless to repeat them here ;
and

and, I shall, therefore, only point out those circumstances in the manner of their use, which are peculiar to the application of them to this purpose.

Of the gilding on paper proper to be used along with painting in water colours, or fresco.—The gilding proper to be used with water colours, may be either with the leaf gold, or powder; which last, when mixed with the proper vehicle, is called shell gold.

The leaf gold is necessary in all cases, where a metalline and shining appearance is wanted; and it may be laid on the designed ground, by means either of gum-water, or isinglass size: the gum-water, or size, should be of the weaker kind, and not laid too freely on the ground, and proper time should likewise be given for it to dry: the judgment on which must be formed in this case, as in the other kinds of gilding, by touching with the finger. The management of the gold also is much the same in this, as in the former; and where a polish appearance is wanting, the dog's tooth, or other kind of burnisher may be used. In the gilding larger surfaces, it will be found advantageous to colour the ground with the gall stone, and where colours are to be laid on the gilding, the brushing the gold over with the gall of any beast, will make it take them in a much more kindly manner.

When the gold powders are used along with paintings in water colours, it is previously formed into shell gold, (as it is called, from its being usually put into muscle shells, in the same manner as the colours.) This shell gold is prepared by tempering the gold powder with very weak gum-water, to which a little soap-suds may be put, to make the gold work more easily and freely.

Of the gilding proper for the coloured paper for binding books, and other such purposes:—This kind of gilding is performed in much the same manner as that for mixing with paintings in water colours; except with regard to the following particulars: First, in this case, the gilding being intended generally to form some figure, or design, the gum-water, or size, instead of being laid on with a brush, or pencil, is most generally conveyed to the ground, by means of a wooden plate, or print, and most expediently by an engraved roller, which makes an impression of the figure, or design intended. Secondly, as the rising of the gold from the surface of the ground, is no disadvantage in this kind of gilding, as it is in that mixed with paintings, the gum-water, or size, may be much stronger, which will contribute both to bind the gold firmer, and to give a sort of embossed appearance, that improves the effect. In this kind of gilding the japanners gold size may be also commodiously employed; for, as the paper must be moistened before it be printed, there is no inconvenience liable to happen from the running of the gold size thus used: where the embossed appearance is wanted in the greatest degree, the gold size should indeed always be used, and, in this case, should be thickened with yellow oker, mixed with as much red lead as the proper working of the print will admit.

The wooden plates, or prints used for gilding in this manner, are worked by the hand, and are to be charged with the gum-water, or size, of whatever kind it be, by letting it gently and evenly down on a cushion, on which the gum water, or size has been copiously spread by means of a proper brush; and then pressing it on the paper prepared by moistening
with

with water, and laid horizontally with some sheets of other paper under it. Where the rolling print is employed, the gum water, or size must be laid on it with a proper brush, immediately out of the pot or vessel which contains it; but too copious a use must be avoided, for fear of spreading it beyond the lines of the design or pattern. The subsequent management of the gold, whether leaf or powder, must be the same as in the foregoing kinds of gilding.

It rarely answers to use the leaf gold in this kind of painting, nor even the true gold powder; but the German powder, or that formed of the leaves called Dutch gold, is mostly employed, and answers well enough the purpose. The manufactures of the gilt and marbled papers, have not been so much cultivated in our own country, as it were to be wished, since very great sums have been always annually paid, both to Germany and Genoa, on this account.

Of gilding proper for letters of gold on paper, and the embellishments of manuscripts:—the most easy and neat method of forming letters of gold on paper, and for ornaments of writings, is by the gold armoniac, as it was formerly called, the method of managing which, is as follows:

“ Take gum ammoniacum and powder it, and
 “ then dissolve it in water previously impregnated
 “ with a little gum arabic and some juice of garlic:
 “ the gum ammoniacum will not dissolve in water,
 “ so as to form a transparent fluid, but produces a
 “ milky appearance, from whence the mixture is
 “ called, in medicine, the lac ammoniacum. With
 “ the lac ammoniacum thus prepared, draw, with a
 “ pencil, or write with a pen on paper, or vellum,
 “ the intended figure, or letters for the gilding; suf-

“fer the paper to dry, and then, or any time afterwards, breathe on it till it be moistened, and immediately lay leaves of gold, or parts of leaves cut in the most advantageous manner to save the gold, over the parts drawn or written upon with the lac ammoniacum, and press them gently to the paper with a ball of cotton, or soft leather: when the paper becomes dry, which a short time, or gentle heat will soon effect, brush off, with a soft pencil, or rub off with a fine linen rag, the redundant gold which covered the parts between the lines of the drawing or writing; and the finest hair strokes of the pencil or pen, as well as the broader, will appear perfectly gilt.”

The manner practised by the professed leather gilders, for the making hangings for rooms, skreens, &c. is not properly gilding, but lacquering, being done by means of leaf silver, coloured by a yellow varnish, on the same principle with the lacquered frames of pictures, &c. which were formerly in use. It is an important manufacture, as the leather ornamented in this manner, not only admits of a great variety of designs in embossed work, resembling either gilding or silver, but also of the addition of paintings of almost every sort.

Of gilding glass without annealing or burning:—glass may be gilt, by applying as a cement any gold size, or other size, gum water, or varnish; and when it is of a proper degree of dryness, laying on the gold as in other methods of gilding. The work may also be polished afterwards in the same manner, if the burnished appearance be desired; but where that is intended, it is proper to add bole armoniac, chalk, or other such substance to the cement.

When

When drinking glasses are to be gilt, without burning, the cement should be either some gold size formed of oil, or some kind of varnish compounded of the gum resins, that will not dissolve in water, but require either spirit of wine, or oil of turpentine for their solution. At present, nevertheless, this is not only neglected by those who gild drinking glasses for sale, but glasses gilded with gum arabic, or the sizes which will dissolve in water, are imposed upon the public for the German glasses, gilt with the annealed gold, and sold at a dear rate under that pretence; though, after they have been used for a very short time, the gold peels and rubs off in spots when the glasses are cleaned, and renders them very unsightly. As the glasses with gilt edges are at present much in fashion, and the true kind are brought from Germany, or elsewhere, the incitement of the cultivating this branch of gilding here, would not be an unfit object of the premiums of the worthy society for the encouragement of arts, since for the doing this work in perfection, there is nothing more wanting, than that dexterity of the manœuvre, which arises from a little practice in matters of this kind.



Of SILVERING.

SILVERING may be practised on the same substances, and by the same methods, either with leaf or powder, we have before pointed out with regard to gilding, variation being made in a few circumstances below mentioned; it is nevertheless but seldom used, notwithstanding the effect would be
very

very beautiful and proper in many cases, and there is an extreme good reason for such neglect of it. The reason is, its tarnishing in a very short time, and acquiring frequently, besides the general depravity of the whiteness, such spots of various colours, as render it very unsightly; and this tarnish and specking is not only the constant result of time, but will be often produced instantly by an extraordinary moisture in the air, or dampness, as well as by the fumes and effluvia of many bodies, which may happen to approach it.

Wherever, therefore, silvering is admitted, a strong varnish ought to be put over it; and this, even is not sufficient wholly to secure it from this destructive consequence. The varnish must be some of the compositions of mastic, sandrac, the gums animi or copal, and white resin; (the particular treatment of which, in the forming varnishes, will be found in other parts of this work;) for the other substances used for compounding varnishes are too yellow. Some put a coat of isinglass size over the silver; but, besides that, the size itself injures the whiteness in time, by turning yellow, it preserves the silver but in a small degree.

The method of making the silver powders is also the same as those of gold, except with regard to one of the German powders, which is correspondent both in its appearance and use, abating the difference of colour, to the aurum mosaicum, or musivum; whence it has been indeed, though improperly, called the argentum musivum: the process for this being, therefore, different from any before given, it is proper to insert it fully, as follows:

“Take

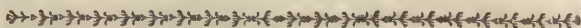
“ Take of very pure tin, one pound, put it into a
 “ crucible, and set it on a fire to melt; when it be-
 “ gins to run into fusion, add to it an equal propor-
 “ tion of bismuth, or tin glass, and stir the mixture with
 “ an iron rod, or the small end of a tobacco pipe,
 “ till the whole be entirely melted, and incorpo-
 “ rated: take the crucible then from the fire, and
 “ after the melted composition is become a little
 “ cooler, but while it is yet in a fluid state, pour into
 “ it a pound of quicksilver gradually, stirring it in
 “ the mean time, that the mercury may be thoroughly
 “ conjoined with the other ingredients: when the
 “ whole is thus commixed, pour the mass out of the
 “ crucible upon a stone, where, as it cools, it will
 “ take the form of an amalgama, or metaline paste,
 “ which will be easily bruised into a flaky powder,
 “ and is then fit for use.”

This powder may be either tempered, in the man-
 ner of the shell gold, with gum water; or rubbed
 over a ground properly sized, according to any of the
 methods above directed for gold powder, and it will
 take a very good polish from the dog's tooth, or bur-
 nishers, and holds its colour much better with a
 slight coat of varnish over it, than any true silver
 powder, or leaf.

The sizes for silvering ought to be mixed, as in the
 case of gold, with yellow, or bole armoniac; but
 with some white substance, whose effect may prevent
 any small failures in the covering the ground with
 the silver being seen, in the same manner as the yel-
 low substances do the gold. This may be done with
 flake white, or white lead, when the sizes formed of
 oil are used; but whiting is the proper matter in the
 burnish size for silvering, or wherever the glover's,

or

or parchment size is used. Some recommend tobacco-pipe clay in the place of whiting, and add a little lamp black, to give a silver-like greyishness to the composition.



Of the NATURE *and* COMPOSITION of GLASS.

THE materials employed to give a body to glass are, sand, flints, talc, spar, and some other stony and terrene fossils.

Sand is, at present, almost the only kind of substance which is used in this intention in the British manufactories of glass, and with great reason, as it extremely well answers the purpose; and does not demand the previous preparation of calcination that is necessary with respect to flints and other stones; and as it can be with certainty procured, in any quantity demanded. The kind of sand most fit for making the white transparent kinds of glass, is that brought from Lynn in Norfolk, by the name of which place it is distinguished: and there is also another kind of this, but inferior, brought from Maidstone, in Kent; it is white and shining, and, examined by means of a microscope, appears to be small fragments of rock crystal, from which it does not seem, by any experiments, to differ in its qualities; and the glass formed of it may, therefore, properly be considered as made of crystal. The introduction of it into the manufactories of glass in this country has almost wholly superseded that of flints, from which it no way differs in this application,

cation, but in the being somewhat slower in vitrifying, which makes it require, in proportion, a greater strength of flux and fire; but to compensate for this disadvantage, it is clearer in its own colour, and much freer from heterogeneous tinging bodies, which injure the colour of the glass, and frequently give embarrassments where flints are used: the sand requires no previous preparation for common and grosser purposes, especially where nitre is used, which burns out the sulphureous matter from any filth of the nature of animal and vegetable substances, and consequently calcines them to an earth no way injurious to the glass; but for nicer purposes, and where no nitre is used, it is proper to purify, or cleanse the sand by washing, which may be thus done; pour water upon it, and having stirred them well about, incline the vessel immediately in such a manner, that the water may run off, and carry with it the filth that will float in it; by repeating which a few times, the sand will be freed from all the heterogeneous matter that is lighter than itself. For coarse glass other kinds of sand, of a softer texture, are used; as, besides the advantage of being cheaper, they are more easily vitriable than flints, and consequently make a saving in the fluxing bodies, which are to be added to them.

Flints are the next important article in the substances which are used for forming the body of glass; and were indeed the only kind employed in larger works, where any better sorts of glass were manufactured, before the use of the white sand excluded them in all places where it is to be conveniently obtained. Since, for the reasons above given, it is a more eligible material, unless for experiments, or

where very small quantities are required; in which case the calcined flints being more easily reduced to an impalpable powder, may possibly be more commodiously employed than the sand. Flints yet, however, continue to be used wherever the proper sand cannot be procured at a reasonable charge, as the sole ingredient for forming the body of the better kinds of glass; since they are, in most places where they are naturally found, to be had in extreme great quantities; and the expence of calcining them does not enhance their whole cost to a degree beyond what the current price of glass bears.

The goodness of flints, with respect to this use of them, must be distinguished by their clear transparent black colour, and all such as are marbled with brown or yellowish colour should be rejected, for fear of iron, which frequently lurks in them under that appearance, and is very injurious to the colour of glass if it get admission into it; such should, therefore, be carefully picked out when found in parcels of the clearer sort; but if the greater part of any parcel appear so marked, it should not be used till trial be made in a small quantity, whether the discolouring be owing to any substance detrimental to the colour of glass or not. It is always necessary that flints should undergo a calcination before they be used in the composition of glass; as well because they are not otherwise to be reduced to a texture, which will admit of their being powdered, in order to their due commixture with the other ingredients; as because they are not susceptible of vitrification till a proper change be produced in them by calcination; this calcination must be performed by putting them into a furnace of a moderate heat, being first dipped in
water,

water, and continuing them there till they become intirely white, even to the most interior part ; which will require a greater or less time, according to their magnitude, and the degree of the heat of the furnace : when they are thus rendered white, they must be taken out of the fire, and instantly immersed in cold water, where they must remain till they be again cold ; and then they will be found, if duly calcined, to be cracked and shivered into flaky pieces, and to become so swiftly brittle as to be easily reducible to powder ; some part will, nevertheless, be always found insufficiently calcined, which may be distinguished by their harder and more obdurate consistence ; and they must be carefully separated, in order to be recalcined, as they will otherwise greatly retard and impede the powdering of the duly calcined parts ; those which are properly calcined, must then be levigated, by means of mills, or other implements, accordingly as the quantity or opportunity may make it expedient ; and they will then be fit for using in the compositions for glafs.

Talc of various species has been likewise used in the same intention as sand and flints, but seldom in large works ; it sometimes requires a calcination, in order to its due preparation for entering into the composition of glafs ; but neither so great a heat, nor the quenching in cold water, are necessary for bringing it to a proper texture to bear powdering. Some sorts of talc are much more quickly vitrifiable than others, and fusing easily with either salt of tartar, or lead, may therefore be used in default of flint, or sand sufficiently white ; but with respect to larger manufactures, the use of flints is more eligable, as

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they are to be procured in great quantities with more certainty; and will, in general, require much less flux and fire to bring them to a due state of vitrification.

Several other, both earthy and stony fossils, have been likewise used, for forming the body of glass; and it has been observed, that most kinds of stony substances, which will scintillate, or strike fire with steel, are vitrifiable within the degree that fits them for this purpose; but as they are neither used at present, nor promise to be any way advantageous in practice, as far as is hitherto known of them, I shall omit enumerating them, as being foreign to the purpose in hand, except with respect to two kinds; the one of these is called moilon by the French, and is found in great quantities, as an upper crust in many free-stone quarries; and, as it may be used without any previous preparation, and is very quickly vitrifiable, may be serviceable on some occasions, to those who may want to form glass, or vitreous compositions, where this may be procured with more ease than any of the beforementioned substances. The other is the white round semi-transparent river pebbles, which vitrify very soon; and, if chosen colourless, make a very white glass; but they must be calcined, as the flint, by putting them into the fire till they be red hot; and then quench them in cold water, in order to bring them to a state fit to undergo powdering.

Knuckle confounds the calcined flints, and all other stones used for making glass, under the name of sand, in his receipts; notwithstanding he admits of a great difference in their readiness to be vitrified;

as in the case of calcined flints, and the softest kind of natural sand; where one hundred and forty pounds of salt are required to an hundred and fifty pounds of calcined flints; and only one hundred and thirty pounds of salt to two hundred pounds of the sand.

Of materials used as fluxes in the composition of glass:—The materials used for the fluxes in the composition of manufactured glass are lead, pearl-ashes, nitre, sea-salt, borax, arsenic, smiths clinkers, and wood-ashes, containing the earth and lixivate salts as produced by incineration.

Lead is the present most important flux in the British manufactures of what is called flint glass; but it must be brought, by previous calcination, to the state of minium, or what is called red lead. This, used in a due proportion, makes a tougher and firmer glass than can be produced from salts alone, and is yet procured at a very small expence. But all the glass formed of lead is tinged originally with yellow, and therefore requires the addition of nitre to burn and destroy the sulphur or phlogistic matter it contains, in order to bring it to a more colourless state; which addition of nitre enhances again the cost of glass so composed, that would otherwise be extremely low. There is another reason, likewise, for the addition of nitre, or some other salt, to operate as a flux in the glass compounded of lead, which is, that there may not be a necessity of using beyond a certain proportion of it; for, if glass have much lead in its composition, it will suffer a corrosion by the air, which gives a greyish dulness to its surface that is very injurious both to its beauty and utility. It is needless here to teach the

the manner of calcining lead, because it is done in works appropriated to that purpose, and is sold by the proprietors of these works, at a cheaper rate than any particular persons could pretend to manufacture it for their private use. The perfection of red lead lies in its being thoroughly well calcined, which is best distinguished by its redness, inclining to crimson, and in its being pure, which may be judged of by the brightness of its colour. There is indeed no materials of a red colour cheap enough to adulterate it with, except powdered bricks, or some of the red okers, and they would immediately shew themselves in the vitrification of the smallest quantity, by the strong yellow tinge they would give the glass.

Pearl-ashes is the next leading article among the substances used as fluxes in glass, and they at present mostly supply the place of the Levant-ashes, the Barillas of Spain, and many other kinds, which were formerly brought here, as well for making glass as soap. In the kinds of glass where perfect transparency is wanted, as in looking-glass plates, and all kinds of window-glass, salts are preferable as a flux; for, as all the lixivate, or fixed alkaline salts of vegetables are the same for this purpose, when pure, and those called pearl-ashes are purer than any other which can be provided at a moderate expence, the use of them is more expedient than of any other. This kind of fixed alkaline salts, called pearl-ashes, is prepared in Germany, Russia and Poland, by melting the salts out of the ashes of burnt wood; and, having reduced them again to dryness, evaporating away the moisture, and calcining them for a considerable time, in a furnace moderately heated; but,

as they cannot be prepared with advantage in this country, and are to be had at a reasonable price, by those who may have occasion to use them in making glass, I shall wave entering more particularly into the detail of the process, by which they may be best and most profitably produced, as not properly falling either within the design or the intention of this work. The goodness of pearl-ashes must be distinguished by the equal and white appearance of them; as it consists in their purity, and their having been calcined for a long space of time, of which the whiteness and equal appearance are marks, unless in the case of some parcels that contain lumps of a bluish cast, produced by calcination; which discolouring is not, however, any proof of their being bad; but any brownish cast in particular parts, or greyiness in the whole, is a certain criterion of their not being good. This must, however, be confined to such as are perfectly dry, which can only well be on the opening the casks they are brought over in; for, if the air have access to them, they soon deliquiate, and look brown or greyish, from a semi-transparency they acquire in that deliquiating state. There is one, and the most common adulteration, which is made in these salts, that is not easily distinguishable by the appearance; it is, the addition of common or sea salt, to them, which is sometimes copiously made; this is not, however, very detrimental in the application of them to the forming glass. But it is, nevertheless, a disadvantage considerable enough in large concerns, to buy one thing for another at six times its current price. As it is expedient, therefore, to know how to distinguish

tinguish this fraud, the following method is proposed as easy and certain :

Take a quantity of the salt suspected, and, after it has lain in the air, so as to be a little softened, but not melted, put it in a fire-shovel, and hold it over the fire where the heat is pretty strong. If it contain any common salt, a crackling, and, as it were, slight explosion will follow, as the salt grows hot ; which decrepitation is a certain mark of common salt wherever it is found.

The pearl-ashes require no preparation, except where extreme great transparency is required, as in the case of looking-glass, and the best window glass ; in which case a purification is necessary, in the manner which will be shewn in speaking of these particular kinds.

Nitre, which in its refined state, is commonly called saltpetre, has been formerly much used as a flux in the finer kinds of glass, and is now likewise employed in most compositions of the same nature. But this is a noted one by those who are at all acquainted with the principles of the art, not so much in the intention of a flux, as of that of a colorific ingredient, from its power of rendering glass colourless, by destroying the phlogiston in lead, or in any kind of vegetable or animal matter, which may tinge the glass. As a flux, it is less powerful than fixed alkaline salts of vegetables, and, being dearer by much, its use would, therefore, be in proportion less expedient than that of pearl-ashes, if it were to be employed in this view only. The saltpetre that is used here is brought from the East-Indies, in the form of what is called crude nitre, and in commercial language rough-petre ; in which
state

state it is commixed with some proportion of common salt; it is refined by persons who make it their proper business, and bought for the purpose of glass-making, in the state of salt-petre, on which account, it is unnecessary to give the process for refining it here. If it be obtained in crystals of such a size, that the figure of them may be distinguishable, there is no hazard of any adulteration, but what would be very apparent, as no heterogeneous matter can be made a proper part of such crystals; and, therefore, if they appear bright and colourless, the goodness cannot be doubted.

Sea salt is also frequently used as a flux in the making glass of various kinds, and it has a very strong power in promoting vitrification, even in some obdurate bodies; but used in a large proportion, it does not produce so strong and tenacious a glass as lead, or even the alkaline salts of vegetables, and is therefore only taken in aid of the others, when admitted as an ingredient: it should be brought to a dry state by decrepitation, that is, keeping it in a moderate heat till it ceases crackling, before it be put with other ingredients into the fusing heat, otherwise, by the little explosive bursts of its parts, it will drive some of the powdered matter out of the pot; it must not, after such decrepitation be again exposed to the air, for if it be, it will regain its former quality of crackling in a short time.

Borax is the most powerful flux of all the salts, or indeed of any known substance whatever, but on account of its great price, can only be admitted into the composition of glass, designed for looking-glass plates, or other purposes, where a considerable value can be set upon the produce, or where the quantity wanted

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is very small. It is brought from the East-Indies, under the name of tincal, and the refinement of it in a perfect manner, is hitherto known but to few persons in Europe, who carefully keep it a secret. The knowledge of it, however, is not important to the art of making glass, as it is always procured for that purpose in a refined state, and not used in very large quantities. The purity of it may be ascertained by the largeness and clearness of the crystals, for when it is had in that state, it may always be concluded good. The previous preparation of borax for the composition of glass, is to calcine it with a gentle heat, which converts it to a flaky, feathery kind of substance, like calcined alum; after which it should be ground to powder, and is then fit to be commixed with other ingredients: this calcination of borax should be with a gentle heat, and in a very large vessel proportionably to the quantity, for it swells and rises in inflated bladders, so as to occupy a very great space.

Arsenic is also a powerful flux, but must not be added, nevertheless, in too great quantity; for, though when once vitrified perfectly, it greatly promotes the same change in other substances, yet, when added in a redundant proportion, it turns the glass milky, or opaque, and keeps it in that state a considerable time before it will duly assimilate, from whence the due vitrification is greatly retarded, so as to occasion an intolerable loss of time and fuel; though the glass in all such cases would become clear, if continued long enough in the fire, yet on this principle of its slowness in vitrifying when added to compositions of glass in a large proportion, it is used for giving an opaque white colour to glass, as we shall see below.

Wood

Wood ashes, by which is to be understood, likewise, those of broom, furze, or any other burnt vegetable, are used as a flux for the common bottle or green glass; the ashes must be taken in their original state, consisting of the calcined earth of the vegetable, and their lixivate, or fixed alkaline salt; as their virtue lies in their original manner of commixture; for this very extraordinary circumstance attends them, that though in their primitive state, they vitrify easily and act as a strong flux to any of the vitrescible earths or stones; yet, if the salts be separated from the earth, by solution in water, the earth from that time becomes extremely repugnant to vitrification; and, though the same salts which were taken away from it, or even a much larger quantity be again added to it, it resists their fluxing power, and displays a nature intirely different from that which it appeared to have before its separation from the salts. There is no preparation necessary for these ashes, in order to their entering into the composition of glass, except the sifting them, to free them from all the fragments of charcoal, or unburnt parts of vegetables employed in their production; but they should be carefully kept from damp and moisture, which would make the salts deliquiate, and run off from the earth: the goodness of these ashes must be distinguished by their appearing free from impurities, and by their whiteness; and their abounding in salt, is likewise a proof of their excellence, which may be examined by making a lixivium of any known small quantity, and judging of its weight.

Of the several kinds of white glass, and their compositions in general:—The several kinds of white transparent glass now in use, in this part of the world,

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are the flint-glass, (as it is here called) and the German crystal-glass, which are applied to the same uses and purposes; the glass for plates, for mirrors, or looking-glasses; the glass for windows and other lights; and the glass for phials, and such kind of small vessels.

Of each of these kinds there are several sorts; some only differing in the particular composition and management of the directors of the works where they are manufactured, but alike in their price, and the uses to which they are applied; and others which are allowedly inferior sorts, sold at cheaper rates, and employed accordingly for coarser purposes.

The several kinds of glass differ in the substances employed as fluxes in forming them, as well as the coarseness and fineness of them which are used for their body. The flint and crystal, mirror, and best window glass, not only require such purity in fluxes, as may render it practicable to free the glass perfectly from all colour; but, for the same reason also, either the white Lynn sand, calcined flints, or white pebbles, should be used. The others do not demand the same nicety in the choice of the materials; though the second kind of window glass, and the best kind of phial, will not be so clear as they ought, if either too brown sand or impure salts, be suffered to enter into their composition. It is to be greatly regretted, that the very important manufacture of glass should not be so cultivated and encouraged in Great Britain, as to prevent totally the importation of foreign: whereas, from the production of sand, lead, and coals, in our own country, we may make the best sorts of glass much cheaper than can be done elsewhere. We yet, however, take looking-glass
plates

plates of France, to the amount of a very considerable sum; some window glass of the Dutch; and the German drinking glasses for water, with gilt edges and other ornaments, are now coming again extremely into fashion. The causes of this demand for foreign commodities, which are, or might be better, and cheaper manufactured here, are various; and the displaying of them not being a proper part of my business at present, I shall wave it; and only intimate, that the tax laid upon glass (against all the principles of good policy) has greatly corroborated them, as well as checked a growing exportation of some articles, which would probably, in time, have been of very great consequence to our commerce.

Of coloured glass:—For blue, take four ounces of calcined and pulverised rock crystal, two ounces of saltpetre, one ounce of borax, half a pound of manganese, one pound of indigo-blue.

A crysolite glass;—To one pound of frit, take pulverised verdigrise three ounces and a half, red lead one ounce.

A saphir green glass:—To one pound of the above composition, or crystal frit, take one ounce of good saffer, and of a curious fine pin-dust two pounds.



JEWELLERS SECRETS.

TO imitate fine oriental pearls:—Take of thrice distilled vinegar two pounds, Venice turpentine one pound; mix them together into a mass, and put them into a cucurbite, fit a head and receiver to it, and after you have luted the joints, set it, when

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when dry, on a sand furnace, to distil the vinegar from it; do not give it too much heat lest the stuff should swell up.

After this put the vinegar into another glass cucurbite, in which there is a quantity of seed pearl, wrapt in a piece of thin silk, but so as not to touch the vinegar; put a cover, or head, upon the cucurbite; lute it well, and put it in *balneum mariæ*, where you may let it remain a fortnight. The heat of the *balneum* will raise the fumes of the vinegar, and they will soften the pearls in the silk, and bring them to the consistence of a paste; which being done, take them out, and mould them to what bigness, shape and form you please. Your mould must be of fine silver, the inside gilded; you must also refrain from touching the paste with your fingers, but use silver gilded utensils, with which fill your moulds: when you have moulded them, bore them through with a hog's bristle, or gold wire, and let them dry a little; then thread them again on a gold wire, and put them in a glass; close it up, and set them in the sun to dry; after they are thoroughly dry, put them, in a glass matrafs, into a stream of running water, and leave them there twenty days; by that time they will contract the natural hardness and solidity of pearls. Then take them out of the matrafs and hang them in mercury water, where they will moisten, swell, and assume their oriental beauty; after which shift them into a matrafs, hermetically closed up, to prevent any water coming to them, and let it down into a well, to continue there about eight days; then draw the matrafs up, and in opening it you will find pearls exactly resembling the oriental ones. This method

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is very excellent, and well worth the trouble, since by experimenting so fine a secret, you will have the satisfaction of seeing the performance answer the direction above expected.

Mercury-water is thus prepared :—"Take plate tin of Cornwall, calcine it, and let the calx be pure and fine; then with one ounce of the calx, and two ounces of prepared mercury, make an amalgama; wash it with fair water, till the water remains insipid and clear; then dry the amalgama thoroughly, put it into a matrafs over a furnace, giving it such a heat as is requisite for sublimation. When the matter is well sublimated, take off the matrafs and let it cool: take out that sublimate, add an ounce of Venice sublimate to it, and grind it together on a marble; put this into another matrafs, close it, and set it upside down in a pail of water; and the whole mass will dissolve itself in a little time into mercury-water: this done, filter it into a glass receiver, set it on a gentle ash fire to coagulate, and it will turn into a crystalline substance; this beat in a glass mortar with a glass pestle to a fine powder, searce it through a fine sieve, and put it into a matrafs, stop it close up, and place it in balneum mariæ; there let it remain till it dissolves again into water, which is the mercury-water, fit for the above mentioned use."

To form large pearls of small ones, as directed by Korndorffer :—"Take of mercurial water 14 ounces; put two ounces sulph. solis into a low matrafs, pour the mercurial water upon it, and let it dissolve and extract; then take of the whitest small pearls 20 ounces, put them into a proper matrafs, and pour
the

the said water upon it. The pearls will, by degrees, dissolve, and at last turn to a clear calx, much like dissolved silver calx; pour off the mercurial water; boil the calx well out and dry it; then put it into a clean crucible by itself; and melt and cast it into what form you please. When cold, polish it in the same manner as you do gems or crystals, and you will have your work of the consistency and beauty of the finest and clearest oriental pearl.

Choice secrets imitating precious stones, or for making artificial gems:—This curious art is arrived to that perfection, that it is capable of imitating precious stones in their lustre, colour and beauty, even to surpass the natural ones, except in hardness, which to obtain, has been, and no doubt still are, the endeavours of several ingenious men.

The art of making artificial gems, consists chiefly in rightly imitating the tints of those that are real; these must be extracted from such things as resist the fire, and do not change their colour, though of a volatile nature: thus verdigrease being put into the fire, is changed to another colour, but when put in fusion with crystal, it retains its natural colour.

You must therefore take such colours as change not, when mixed together; therefore since blue and yellow make a green, you must take such blue as will not hurt the yellow when you mix them, and also such a yellow as shall not be detrimental to the blue, and so of the other colours. We shall give very plain and certain instructions to carry the ingenious artist with ease and pleasure through this labour, and first shew him—

To make a fair emerald:—Take of natural crystal four ounces, verdigrise forty-eight grains; crocus
martis

martis prepared with vinegar, eight grains; let the whole be finely pulverized and sifted; put this together in a crucible, leaving one inch empty; lute it well, and put it into a potter's furnace, where they make their earthen-ware, and let it stand there as long as they do their pots; when cold, break the crucible, and you will find a matter of a fine emerald colour, which, after it is cut and set in gold, will surpass, in beauty, an oriental emerald; if you find that your matter is not refined, or purified enough, put it again, the second time, into the same furnace, and in lifting off the cover you will see the matter shining; you may then break the crucible, but not before, for if you should put the matter into another crucible, the paste would be cloudy and full of blisters; if you cannot come to a potter's furnace, you may build one yourself with a small expence, in which you may put twenty crucibles at once, each with a different colour, and one baking will produce a great variety of gems: heat your furnace with hard and dry wood and keep your matter in fusion twenty-four hours, which time it will require to be thoroughly purified, and if you let it stand four or six hours longer, it will not be the worse for it.

To make paste for imitating an oriental topaz:—The colour of this stone is like water tinged with saffron, or rhubarb; to imitate it, take of prepared natural crystal one ounce, of red lead seven ounces, finely powdered and searced; mix the whole together, and put it into a crucible, not quite full by an inch, least the matter should run over, or stick to the cover of the crucible in rising, then proceed as directed above.

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To make an artificial chrysolite:—This stone is of a green colour, and some have the cast of gold; to imitate it, take natural crystal prepared two ounces, red lead eight ounces, crocus martis twelve grains; mix the whole finely together, and proceed as before, only leaving it a little longer in the furnace.

Another process for counterfeiting precious stones; take of black flint stones what quantity you please, and put them into a pail of hot water, and being wet, put them into a hot furnace; this will prevent their flying into small pieces; or else warm them thoroughly, by degrees, before you put them into the furnace; when you see that they are thorough red hot, then quench them in fair water, and they will look of a fine white colour, dry and pulverize them very fine; this you may do in an iron mortar, but, as it may contract some of the iron, it will be proper, after you have taken it out, to pour on it some aquafortis, which will clear it of the iron, and so disengage it from all filth and impurities; wash it in several clean hot waters.

This powder, thus prepared, is fit to be used for making the finest glass, and for imitating the clearest and most transparent gems, especially those that require the lustre of a diamond or ruby; as for a saphir, emerald, topaz, chrysolite. spirel, amethyst. &c. your labour with aquafortis may be saved, if your mortar be bright and free from rust; such as have a mortar of porphyry, or such like stone, have no occasion to use an iron one, but will save themselves a great deal of trouble.

In case you cannot have black flint stones, you may content yourself with pebble, but flint is far preferable,

preferable, and makes the glass of a harder substance than that made of pebble

Bartholomew Korndorfer's secret to make a diamond of natural crystal:—Take the best polished crystal, no matter whether large or small, so it is but clear and transparent, put it in a crucible, with three times as much of my fixed sulphur of gold, so that the crystal may be covered all over with it, then, after you have put a lid over it, and luted the crucible well, let it for three days and nights anneal in a strong fire, then take it out and quench it in spring water, in which red hot steel is quenched forty-six times running, and you will have a diamond which resembles a natural one in every respect, and is right and good.

Thus for Korndorfer, but as to his sulphur, he has left us in the dark.

How to make a diamond out of a saphir, according to Porta's description:—We use to make it, (the diamond) the surest way, in this manner; we filled an earthen pipkin, or crucible, with quick lime, and laid the saphir in the midst thereof, covering it first with a tile, and then with coals all over, blowing them gently until we had a clear fire; for if it is blown too much, it may occasion the breaking of the stone.

When we thought that the saphir had changed its colour, we let the fire go out of itself, and took it out to see whether it was turned white; if so, then we laid it again in the crucible, in order to let it cool with the fire; but if it had not the right colour, then we augmented the heat again as before, and looked often to see whether the fire had taken away all the

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colour; which was done in about five or six hours; if then the blue colour was not quite gone, we began our operation afresh until it was white and clear. It is to be observed, that the heat of the fire, in the beginning of the operation, must increase by slow degrees, and also in the same manner decrease; for if the stone comes either too suddenly into the heat, or from the heat into the cold, it is apt to turn dark, or fly to pieces.

In like manner all other precious stones lose their colour, some sooner than others, according as they are either harder or softer. The amethyst is very light, and requires but a slow fire, for if it has too much heat, it becomes dark, or turns into chalk.

This is the art whereby inferior precious stones are changed into diamonds; they are afterwards cut in the middle, and a colour given them; and from hence comes the second sort of false diamonds, or doublets.

A plain direction concerning the polishing of these counterfeits, and also of natural gems:--It is to be observed that all glass, or artificial stones, may be cut and polished after one method; namely, by strewing fine powdered emery upon a leaden plate with water, holding the stone firm, and grinding it in what form or shape one pleases.

If you sling ground tripoli, mixed with water, upon a pewter plate, and add a little copper ashes amongst it, it will have the same effect.

Pulverized antimony strewed upon a smooth plate of lead, with the tripoli and vinegar, polishes not only glass, crystal, garnets, calcedons, agates and amethysts, but all other natural stones, except the diamond. The diamond is only cut with the diamond

diamond powder itself. Any such diamonds which can be touched by emery, lead, copper, or other metals, or be cut therewith, are false; and this is a good test for knowing a real diamond.

The method of counter-drawing on artificial stones, the original cameaus, intalios, and other gems, which are kept and preserved in the several museums of Europe:—Chuse the finest sort of tripoli which can possibly be found; grind it on marble, into an impalpable powder, and as subtile as possible; add a little water to it, so as to make a sort of paste with it, of the consistence of colours on pallets for painting; when it is in that state, put it in a little square tin mould, with turned-up edges; press well your paste down in it, and smoothen the surface; as soon as you see it begins to dry, stamp on it the seal of which you want to obtain the impression, and taking it off skilfully from the tripoli paste, let this dry thoroughly; when you find it is perfectly hard, and the strokes of the seal are solids, put on the impression some powder of crystal, or any artificial stone you please, whether red, green, blue, or any other colour; then, with a metal pipe, blow on that powder the flame of a candle, or a lamp, till the crystal is perfectly melted; when done, lay something, such as a small iron pallet, of nearly the size of the seal, on the melted paste, and press it gently to make it take the better the impression, and all the turns of the design, and then let it cool. When you take the crystal up you will find it to be a perfect copy of the original; you may then send it to the lapidary to be cut, and set for seal or ring as you like. From these very copies you may even get other copies, by following the same process of operation.

When

When you have made on the tripoli paste the impression of the original seal, the safest and shortest way would be to bake it in a furnace, under a tin arch, to prevent the coals from touching the impression, which might hurt and damage the relief; then take off your little tin mould, and having put on the stamp, crystal powder, or other fusible matter, you may place it again under the same arch, in the furnace, and when that powder is melted, do as before directed.



MISCELLANEOUS SECRETS.

TO preserve things from corruption in spirit of wine:—This is done in the most subtle rectified spirit of wine camphorized, wherein many sorts of animals, as birds, fishes, insects, reptiles, &c. may be kept many years from decaying or corruption. Porta relates, that he had seen a fish at Rome, thus preserved for above twenty years, which was as fresh as if alive: likewise at Florence he saw one that had been preserved above forty years. The glasses wherein they were kept were hermetically sealed, to keep the least air from coming to them.

The preparation of the spirit or oil of salt, whereby things may be kept from corruption, and which is a great restorer and preserver of health:—Take sea salt as much as you please, put it in a crucible covered, over a good coal fire, and when it has done crackling, take it off, and put it in a damp place till it is dissolved, filter it often through a paper, till it is thoroughly clear and fine; then let it digest in
 horse

horse dung for about two months, changing the dung often for fresh, in order to keep it continually warm; then distil it over some sand, and you will have in your receiver a salt oil, with a watry phlegm, distil this gently in a baln, and the oil will remain behind, but the watry substance be carried off. Whatever is put into this oil, will keep from corruption, without changing, for ages. This is the salt spirit which by Paracelsus is called *vividitas salis*, and has incomparable virtues, as well to restore men to health and vigour, as also to preserve them from most distempers; four or six drops, taken in wormwood water, is good for the dropsy, convulsions, and the yellow jaundice; three or four drops taken in hartshorn water, is good for all sorts of agues; for worms it is taken in brandy; three drops taken in carcit, or water of *Carduus Benedictus*, is good for the stoppage of urine. It is a fine remedy for all sorts of sprains and contractions of the nerves; it heals bruises and swellings, when mixed with other ointments, and the affected parts are anointed therewith. When mixed with oil of turpentine or wax, or camomile, it will assuage the gout. This oil, or spirit of salt, if well rectified, is a solvent of all sorts of metals and stones, and a key to many hidden mysteries.

But if this preservative is too costly to keep things from corruption, you may prepare a sea water with a small expence, which will keep things for many years; and this you may do in the following manner:—After you have searfed your sea salt, dissolve it in distilled rain water, and make thereof a lee which will bear an egg. Or, when the salt is searfed, put it into a damp place, and when it is dissolved,

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dissolved, filter it through a paper, so long till it is clear and fine. This you may use to preserve things from corruption, by distilling it, and pouring it over the thing to be preserved.

A secret to cause the transmutation of iron into the finest German steel:---Take of clean foot one pound, oak-wood ashes twelve ounces, and four of pounded garlick. Boil all together in twelve pounds of common water, reduced to a third, or four pounds. Strain this, and dip in it the iron pegs, which you will afterwards stratify with the following cement: Take burnt wood coals, otherwise called cokes, and quick lime, of each three pounds; foot dried and calcinated in an iron pan, one pound; decrepitate salt, four ounces: make of this and your iron several beds alternately, one over another, and having well luted the vessels in which you shall have made those beds of iron and cement, give them a reverberating fire, for three times twenty-four hours, and the operation is done.

To preserve the brightness of arms:---Rub them with hart's marrow; or else, dissolve some alum powder with the strongest vinegar you can find, (that of Montpellier, which serves to make their famous verdigrise, is the fittest) and rub your arms with it; by these means they keep for ever bright and shining.

Against rust, spots, &c. in iron:---Crucible powder, sifted emery, and silver ore, all in fine powder; add thereto the beaten scales of iron, and rub the rusty parts with leather dipt therein.

To make tin:---Take a discretionable quantity of rye-bran, quite pure; boil it a minute or two in vinegar, then add to it a little water, and in that
same

same instant plunge your sheets of black iron; then take out of the fire, and stop well the vessel. Let your iron rest there and soak for twenty-four hours, after which time take off your iron sheets; score them well with the very bran with which they have been soaking, then rub them over a little with grindstones. This being done, make them soak again in a water wherein you shall have dissolved some ammoniac salt, whence having taken them off, set them to drain, and rub them afterwards with rye-bran, and your tin will be done.

Observe that the vessel in which you lay your sheets to soak, must be large enough to receive them in their full intended size.

To compose a metal of a gold colour:—Take refiner's copper six ounces; melt it in a crucible; add one ounce of calaminary stone, half an ounce of tutty, and one of terra merita, in powder; give to this a melting fire for five or six hours running, and no more; then take off the crucible from the fire. Put this composition in powder, and add to it two ounces of common mercury, six of sea-salt, exsiccated, and a sufficient quantity of water. Set the whole to boil until there appears no more mercury; then put the matter into a crucible, and place it between two fires of kindled coals, avoiding carefully the breathing of the fumes: give this a melting fire, for two hours, then wash the composition in water, till this runs off quite clear; set this again in a crucible, and when melted, pour it into an ingot. This will give you a metal of the most beautiful gold colour which can be desired, and which you may make use of for plates, buckles, snuff-boxes, cane-heads, &c. But one cannot recommend too much the avoiding of breathing the fumes of this composition, while it is making.

How to give some perfection to imperfect metals:— It is well known that gold is the most perfect of metals. After this comes silver, the principles of which are very near pure, and equally proportioned between them as those of gold. All other metals are reckoned imperfect and crude. Among them however that which approaches nearest to perfection, is copper. This therefore may easily be purified, by being delivered of all the superficial and combustible sulphurs with which it is loaded, and whoever will proceed according to the following direction, will not fail to obtain it :

Take what quantity you please of copper; set it in a crucible over a melting fire; while melting in the crucible, throw in at different times some tutty powder, mixed with equal parts of refined saltpetre; then, the detonations being made, take the crucible out of the fire and let it cool; break the crucible and separate the scories, from the regulus; put the copper regulus into another crucible, and reiterate the same operation three times, till the copper is extremely fine, and a true gold colour.

Now, if you set it melting for the fourth time, and project on it persicaria's or hydro-popper's leaves powder, you will render it still more perfect; and you might thus purify it so far, as to give it, at last, all the qualities of gold.

Whoever will know how to purify brass from its foreign sulphur, will turn it likewise into a very fine silver.

You may also whiten lead; and, by giving it the hardness of silver, render it similar to it.

Pewter and quicksilver may likewise be purified, in separating from this last its arsenical sulphurs, and
fixing

fixing it by the supplement of a fixed, metallic, incombustible and solary sulphur. The other may, by taking off from it its superfluous saline part, and uniting its mercurial one to the true metallic sulphur; but this we cannot expect to attain, if not previously versed in the method of dissolving, analysing, and dividing or separating, and then re-embodiment again metallic substances; and this is known by none but the sons of the art, the adepts alone.

To restore gold to its weight, after it has lost it in regal water:—Put a bit of tortoise-shell to soak, for some time, in regal water, then put your gold in it, and, by that means it will recover its lost weight.

To operate the transmutation of silver into gold:—Get a new iron pan, make it red hot upon a trevett, and then put two pounds of lead into it; as soon as this is melted, throw over it by degrees, some good saltpetre pulverised, and this will melt likewise; keep it thus in fusion till it is at least half dissipated; should it take fire during that time it does not signify, for it hurts nothing, and the more concocted over again the salt-petre is, the stronger the oil.

Let this cool; divide the saltpetre from the lead; after having well pounded it on a marble stone, carry it into the cellar, there it will fall into deliquium which you will pour into a cucurbit, with double its weight of true French spirit of wine, added by little and little at a time; then distil by a slow fire; grind on marble as before, what remains in the cucurbit, and being turned into deliquium, put it again into the cucurbit with some more spirit of wine; take off these dissolutions and cohobations, repeating the same process over again as before, till the saltpetre remains at the bottom of the cucurbit resolved into a

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true oil which congeals itself no longer, and this will procure you what is called the fix-balm.

Next to that operation, you will make an aquafortis with equal parts of saltpetre, dried vitriol, and rochalum; and before you put the receiver to the cucurbit, add steel filings, antimony, verdigrise, in subtile powder, tutty and cinnabar, of each half an ounce, or one ounce, according to the quantity of aquafortis you want to draw. Cohobate the spirits seven times over, upon the fæces, which you will grind each time on a marble table.

Dissolve one ounce of silver in three of this liquor; and, on that solution, still, drop by drop, one ounce of your nitre-oil, in a bottle made like the hour-glasses, which, after the operation must be at most only half full, and which you will cover with another inverted, so that the neck of the under one should get into that of the upper one. Or else, put it in a matrafs with a long neck, which you will seal hermetically; but, if you make use of bottles, take care to lute the joints; place this over hot ashes, and plunge it in them to the height of six inches. Give under this a lamp fire, which should not reach the matter by three fingers distance. You will get every day to the amount of a silver pennyweight of silver fixed into gold; and when the whole shall have been fixed thus, day after day, the aquafortis, which before was green as an emerald, will become as clear as pump-water. Let the composition cool, and divide the water from the oil, which will never be the worse for use, and must therefore be preserved. At the bottom of the vessel you will find the silver fixed into gold.

Permutation of lead into silver:—Take fine lead, calcine it with common salt, or else with that sort of salt which is extracted from the dregs, fæces, or caput mortuum of saltpetre and vitriol calcinated both together; soak the whole warmly with oil of vitriol till you make it come into an unctuous paste; this you will put into a pot or crucible, well luted, and placed in a pan full of sand, with which you will cover it over intirely. Make under this a digesting fire; that is to say, such a fire as is necessary to warm the sand; keep it so for ten days, then take off your matter and test it. Out of one hundred and five pounds of lead, you will draw five marcs, or two pounds and a half weight, of silver capable to stand the test.

Transmutation of iron into copper:—Iron is easily changed into copper by means of the vitriol; to do this you put your iron stratum super stratum in a descensorium, and set it over a strong blast fire, pushed by bellows, till the iron melts and flows into copper; you must not forget, when you have made your beds of vitriol, to water them a little over with vinegar saturated of saltpetre, alkaline, and tartar salts and verdigrise.

Spots very effectually taken out of silk, linen, or woollen:—Spirits of turpentine twelve drops, and the same quantity of spirits of wine; grind those with an ounce of pipe-maker's clay, and rub the spots therewith; you are to wet the composition when you do either silk, linen, or woollen with it; let it remain till dry, then rub it off, and the spot or spots will disappear. The ingenious Dr. Godfrey says, that true spirits of salts is the only thing to
remove

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remove iron moulds from linen; and sal armoniac, with lime, takes out the stains of wine.

An excellent water for taking out spots in cloth, stuff, &c.---Spring water a quart, put into it a little potashes, about the quantity of a walnut, and a lemon cut in small pieces, let it stand twenty-four hours in the sun, then strain it through a cloth, and bottle the clear liquor for use. It takes out all sorts of spots in any kind of thing. Wash the place where the spots were, after being taken out, with fair water. This liquid is preferable to the before mentioned balls for taking out spots, &c.

For preserving from rust:---Take an eel, fry it, press out the oil, and rub you furniture in metal therewith.

Against moths, worms, &c.—Dry the herb botris, strew it among your cloaths, and neither moth or worm comes near them.

How to make ball soap, and its great use in families:---This soap is easily made, and goes much farther than the other soap. You are to make a lee from ashes and tallow, then put the lees into a copper, and boil them till the watery part is quite gone, and there remain nothing in the copper but a sort of nitrous matter, to this the tallow is put, and the copper kept boiling and stirring for above half an hour, in which time the soap is made; it is then taken out of the copper, and put into tubs, or baskets with sheets in them, and immediately, whilst warm, made into balls. You are to take notice, that it requires near twenty-four hours to boil away the watry part of the lee.

Chinese method of mending china:—Boil a piece of white flint glass in river water five or six minutes,
beat

beat it to a fine powder, and grind it well with the white of an egg, and it joins china without riveting, so that no art can break it again in the same place. You are to observe that the composition is to be ground extremely fine on a painter's stone.

A good common cement:—Beat the white of an egg very clear, and mix it in lime in very fine powder; join the broken pieces together with this and let them stand till they are quite dry.

A very strong cement for broken chinaware:—Take equal parts of isinglass, mastic, and turpentine; beat them together in a stone mortar till they are well united, and then join the pieces well together. They will sooner break in a new than the old place. If the turpentine is not enough to render the other ingredients of a proper consistence, add more till it is.

To join broken amber:—Anoint the pieces with linseed oil, and hold them as close to the fire as you can till they stick, and then set them by to dry at leisure.

A certain method to whiten ivory:—When ivory is turned yellow or red with long keeping, boil it in strong lime water, suppose a pound of lime to a quart of water, and if that has not the desired effect, add more lime. This method never fails to bring it to a proper whiteness.

To make fine hard red sealing-wax:—Take of gum lac, or shell lac, half a pound; melt it in an earthen vessel, and then add an ounce and a half or two ounces of vermilion, in very fine powder; when they are well mixed over the fire, and are become of a proper coolness, make them into sticks or balls. If you would have a coarser sort, take
half

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half lac and half rosin. If a coarser still, take red lead instead of vermillion.

To make balck sealing-wax :---Use the same lac in the manner directed above, only instead of vermillion mix it with ivory black.

To make oil-cloth for hat-cases and other uses :---Take drying-oil and set over the fire, and then dissolve rosin in it, or which is better but dearer, gum lac. There must be so much of either as will bring the oil to the consistence of balsam; then add some colour to it, as verdigrise for a green, umber for a hair colour, white lead and lamp black for a grey, or indigo and white for a light blue; spread this over canvas or linen cloth, so that it may be fully drenched or glazed over with a brush, and when it is quite dry no wet can touch it. That made of lac and applied to fine linen would make good great coats for those that travel much in all weathers. Some have lately laid this composition on silk. These fine sorts may be rolled up and put in the pocket, being exceedingly proper for gentlemen, or any that ride out with good cloaths, and would not have them spoiled. Some of this varnish should be laid on the seams after the garment is made, and then no wet can soak through.

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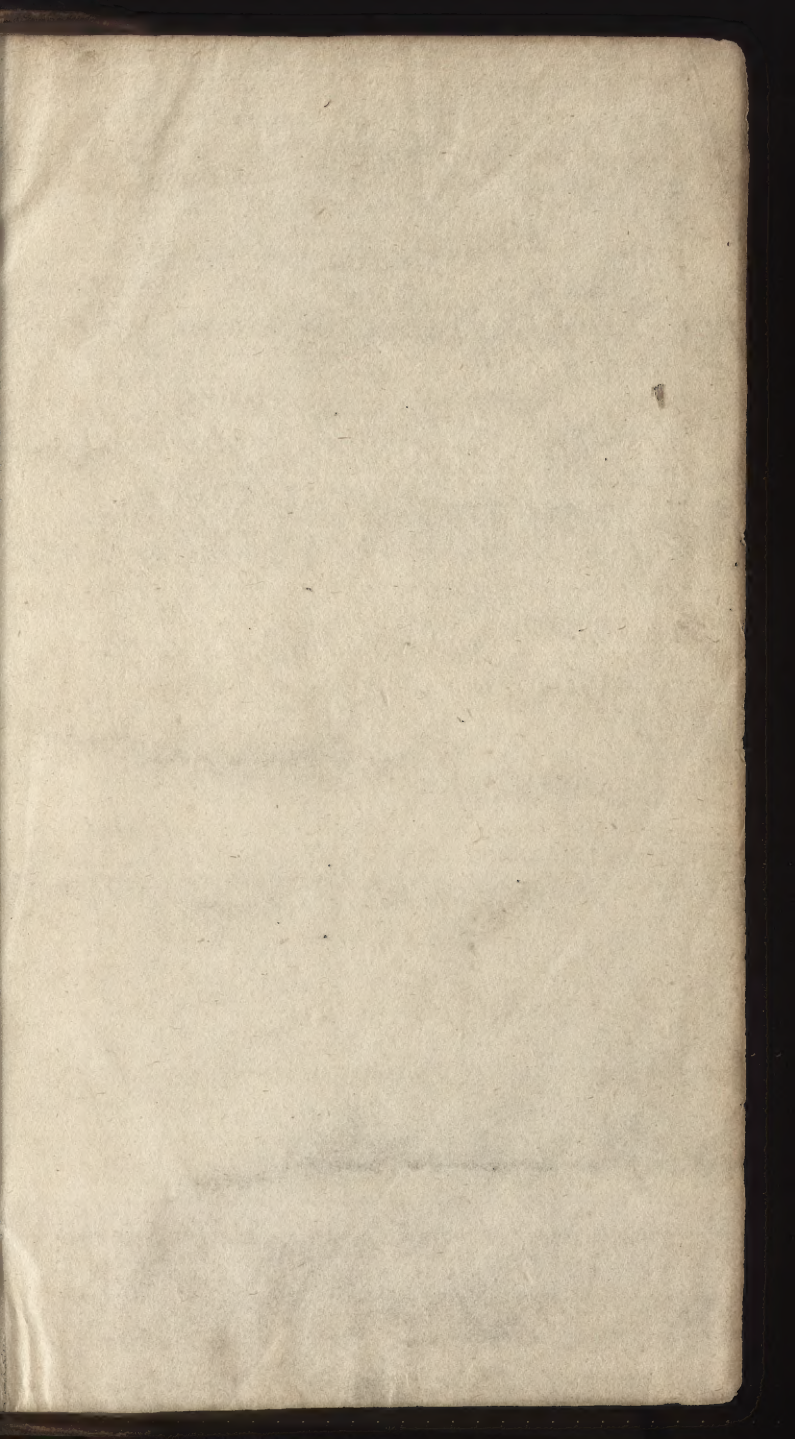
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Thin & Yellow

Yellow Ocher

Small blue

Umbre of a Very Drying nature

Lamb Black either oil or water

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